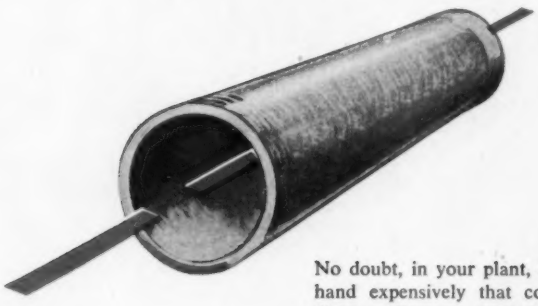
if it can be pushed through a pipe . . .



you can pump it with a

MOYNO®

No doubt, in your plant, certain materials are being moved by hand expensively that could be pumped economically by a Moyno. They pump anything that can be forced through a pipe . . . from very thin liquids to heavy, non-pourable abrasive substances . . . even materials containing suspended particles! As the illustration shows, progressing cavities, formed by the helical screw-like rotor turning inside the double-helical stator, move smoothly along, carrying the material with them . . . the cavities don't squeeze the substance . . . can't stick or gum up. Moyno pumps will not cause churning, foaming . . . won't aerate or vapor-lock!

Moynos are adaptable for a wide range of substances simply by modifying the materials the pumping elements are made of. They are available to pull up to 29" of vacuum while discharging under pressure. If you have a pumping problem, chances are a Moyno will solve it!

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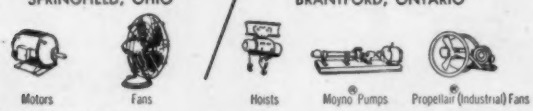

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'ROUND ABOUT

with the editors in field and office

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Hopkins Joins Hooker P.E. Staff

C. Newton Hopkins recently joined the staff of Hooker Chemicals Limited at North Vancouver, British Columbia. He will report to **Lawrence P. Hallahan,** plant engineer, and will handle maintenance engineering.

Born in Vancouver, Mr. Hopkins graduated from the University of British Columbia, receiving a degree of applied science in chemical engineering in 1949. Since 1951, he had been at the Shawinigan Falls plant of Canadian Industries Ltd. as a maintenance supervisor and as plant supervisor of the cell room and caustic finishing plant. Previously, he was employed as an engineer at Canadian Industries' Windsor, Copper Cliff and Montreal plants.

Refreshers for Plant Engineers

SEVERAL TWO-DAY conferences on subjects of interest to plant engineers will be presented at the University of Wisconsin. These are:

Industrial Noise Control—May 1 and 2—This seminar will include discussions on what noise is, how you measure it and the effect of noise on the individual. Ways of reducing or controlling noise in equipment, offices and working areas will also be discussed.

Engineering Photography—May 9 and 10—Discussion and demonstrations of the latest photographic techniques available to the engineer to help him do his job quickly, easily and more efficiently will be discussed. Experts from the field will discuss costs and benefits of photography in engineering.

Water Conditioning—May 15 and 16—Discussion topics at this meeting will include the water cycle, properties of water, nature of water impurities, water tests and analyses, water treatment methods and nature and identification of deposits. Other topics will cover boiler water treatment, boiler scale and corrosion protection, boiler carryover and embrittlement protection, return line protection, cooling water systems and treatments. Persons responsible for the operation of heating, process or power equipment will find this program helpful. The rapidly developing application of recirculating cooling waters will receive proper emphasis in this meeting.

Engineering Organization—May 21 and 22—Chief engineers, works managers, plant engineers, managers of research and development departments, and others holding similar positions have the problem of making the best use of the time of the engineers in their department. Current information in three general areas will be stressed: 1. management controls, 2. operating techniques, and 3. understanding of the human relationships involved.

Further information about any of these seminars may be obtained by writing to Engineering Institutes, University Extension Division, The University of Wisconsin, Madison 6, Wis.

Plant Engineer Castelli

Alphonse Castelli was appointed plant engineer of the Dalmo Victor Co., Belmont, California. In his new position, he will supervise complete maintenance of new two million dollar plant.

He previously held the title of chief electrician. He is a licensed electrical contractor and was responsible for installation of the complete electrical facilities in the new plant.

Experienced in both electrical and oil burner operations, he joined the company 11 years ago.

Advice on Petroleum Problems

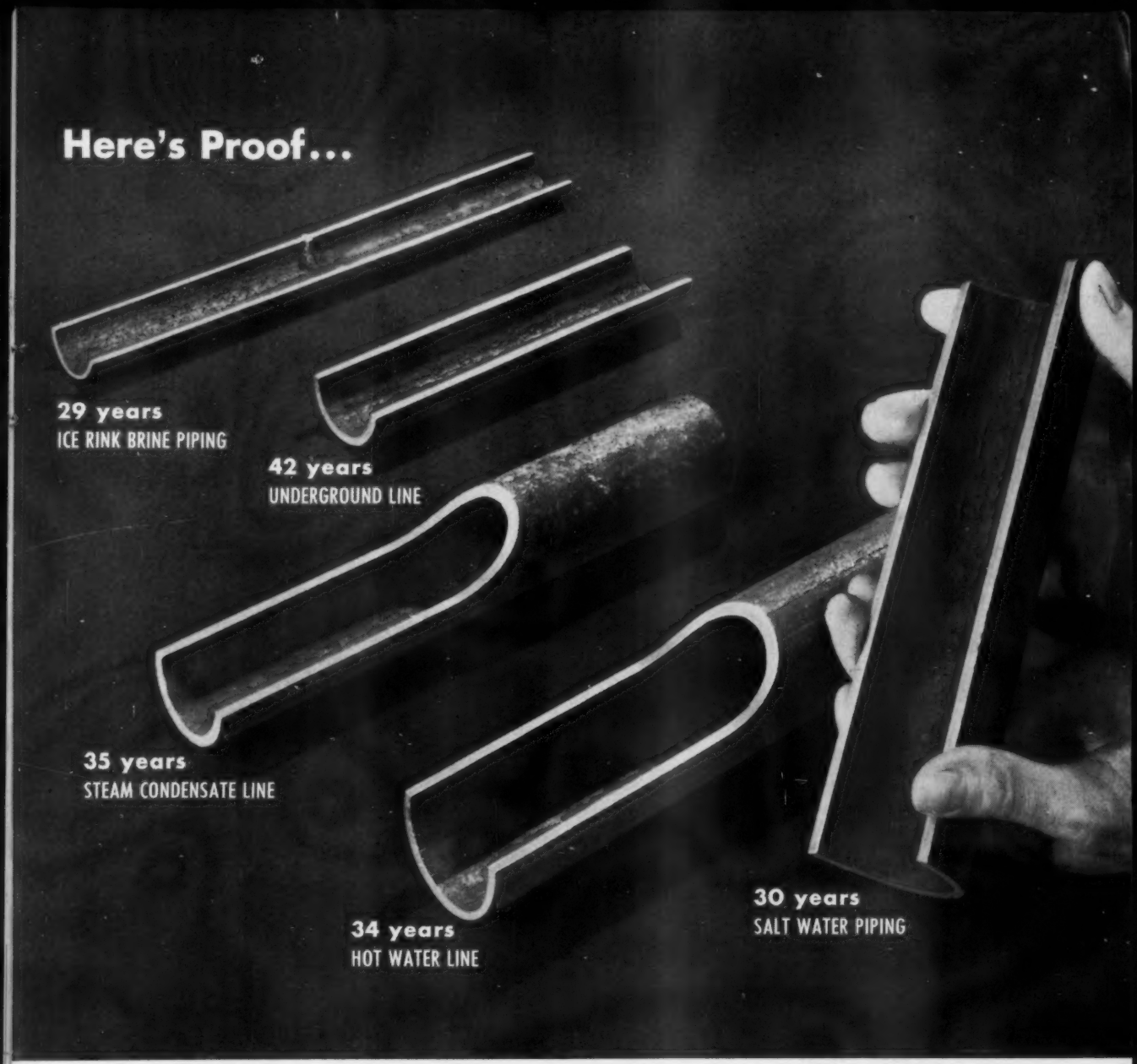
ASSISTANCE IN solving problems involving fuels, lubricants and other petroleum products is yours for the asking. All you have to do is contact Gulf Oil Corporation's Petro-engineering Service.

How does this service work? A trained representative will call at your plant to give you impartial advice on any problems in any way related to the uses of petroleum products.

Several examples listed here will give you an idea of what problems such a service can solve and how it may be of help to you: Organize lubrication as a centralized function for greater efficiency; Reduce the number and variety of lubricants used; Cut maintenance costs through improved application of lubricants; Select rust preventives according to the exact kinds of protection you need; Eliminate or reduce oil vapors, sludge deposits and corrosion of fuel oil storage tanks; and many others.

If you have a problem in your plant

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.



Over 250,000 fibers of glasslike iron silicate guard each cross-sectional square inch of wrought iron pipe against corrosion

Wrought Iron Pipe pays off in years of service rendered

There's a practical, dependable way to evaluate a piping material's potential in corrosive service: check its performance under actual field conditions.

The photo above shows how wrought iron pipe measures up when this service-life yardstick is applied. Here you see actual samples taken from wrought iron pipe installations in a variety of corrosive services. Some of these sections came from buildings that were being torn down. Some were cut from in-use installations by our laboratory staff.

The reasons why wrought iron pipe has lasted so long and remained in such excellent condition are found in the material's structure and composition. Tiny fibers of glasslike iron silicate are threaded throughout the body of high-purity iron. These non-rusting fibers are highly resistant to corrosive attack. When corrosion strikes, these fibers halt and detour the attack, prevent rapid pitting and penetration.

Our bulletin, *Piping for Permanence*, presents in detail wrought iron pipe's case against corrosion. Write for a copy.

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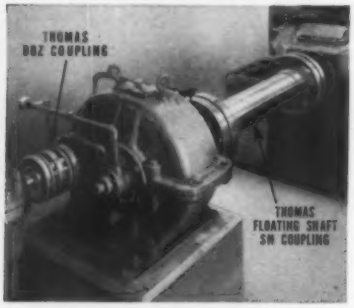

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NO WEARING PARTS

Future maintenance costs and shutdowns are eliminated when you install Thomas Flexible Couplings. These all-metal couplings are open for inspection while running.

They will protect your equipment and extend the life of your machines.

Properly installed and operated within rated conditions, Thomas Flexible Couplings should last a lifetime.

UNDER LOAD and MISALIGNMENT ONLY THOMAS FLEXIBLE COUPLINGS OFFER ALL THESE ADVANTAGES.

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5 Original Balance for Life
6 No Lubrication
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'ROUND ABOUT

and would like to avail yourself of this service, contact any one of the district sales offices of Gulf Oil Corp. An illustrated booklet describing this service may be obtained from the Gulf Oil Corp., 1822 Gulf Bldg., Pittsburgh 30, Pa.

Two-Week Material Handling Training Conference

FOURTH ANNUAL Material Handling Training Conference will be held at the Industrial Management Center, Lake Placid, New York, from June 16th through the 29th.

The director of the conference, James R. Bright, said that the new session will concentrate on the cost reduction opportunities possible through material handling improvement. Other subjects will discuss ways of eliminating handling bottlenecks and better usage of storage space. To keep the courses on a practical level, attendance will be limited to men in industry with a minimum of three and preferably five years' experience. Two classes of not more than 28 men will be held.

An illustrated brochure describing the course is available by writing to James R. Bright, Director, Industrial Management Center, 56 Robbins Road, Lexington 73, Massachusetts.

New Appointment at Chrysler

Kenneth C. Butterfield was appointed staff master mechanic of Chrysler Corp., Detroit, Mich. In this new position, he will be responsible for the administration of the central master mechanic department. He will also provide technical guidance for master mechanic activities throughout the corporation.

Butterfield joined the company in November, 1956. From 1937 until that time he was associated with the Fisher Body Division of General Motors, serving in various capacities in the master mechanic department. His latest assignment was at the Fisher Body Pittsburgh plant, where he served as master mechanic and plant engineer.

How Not To Get Along With People

RECENTLY, Dr. Martin Schaul, industrial psychologist with the National Foremen's Institute, a division of Vision, Inc., received a letter from a foreman, listing ten suggestions on how department heads, superintendents and managers can demoralize their foremen and make them feel insecure.

1. Bypass the foreman whenever you have anything to tell one of his men.
2. Whenever a department fails to meet its production schedules, rush down to the shop and start yelling at the foreman, preferably in front of his men.
3. When you want something done, make sure that it takes priority over anything else he might be doing.
4. When he gets into trouble, keep reminding him of it and don't do anything concrete to help him.
5. Never ask him for any advice. Don't discuss your problems with him.
6. Don't give him any leeway in running his department. The less freedom he has, the less likely he'll get you into trouble.
7. If he does a good job on occasion, disregard it. Let him know that's what you have a right to expect.
8. Delegate as little authority to him as possible. Don't give him the feeling that you trust him.
9. Keep pushing him all the time.
10. Encourage your foremen to compete against each other. Don't try to build harmonious relations among them.

New Appointment for C. S. Beard

Chester S. Beard was recently appointed to head the Control Valves and Actuators Engineering Div. of General Controls Co., located at the company's Western Research and Development Center, Glendale, California.

Prior to his present appointment, he served as research and development engineer with Foster Engineering Co. and with Ebasco Services in New York as instrument consultant.

Readers may recall seeing several articles in past issues of PLANT ENGINEERING which were authored by Mr. Beard. One of the articles, titled "Instrumentation Planning Procedures" appeared in the February, 1956 issue; the other article "Coordinating Plant Instrumentation," appeared in the August, 1956 issue.

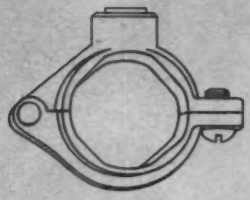
Conference on Building Care

WEATHERPROOFING THE Building Shell is just one of the ten technical subjects which will be discussed at the Building Research Institute's Sixth Annual Meeting. The sessions will be held at the Drake Hotel, Chicago, from April 15th to the 17th.

Speakers for this session and their topics will be: G. G. Garlick, of Protection Products Mfg. Co., on "Improving Wood Weather Resistance"; D. MacDonald, of Owens-Corning Fiberglas Corp., on "Better Roof Construction"; R. B. Taylor, of Structural Clay Products Research Foundation, on "Weather-Tight Masonry Construction."

Additional technical sessions presented at this three-day meeting will be: Machine Application of Materials at the Site, New Paints and Methods of Painting, Construction in Chicago's Future, and Panel Cooling and Heating Research.

Easy to ship, store, and handle!



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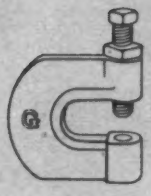

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Contact your nearby Grinnell warehouse, or see your local distributor.

Now, a wide selection of Grinnell Pipe Hangers comes to you in new, convenient, easy-to-handle packages that require a minimum of shelf space. Available in master containers — each of which holds from two to twelve smaller, individual cartons — Grinnell Hangers stay in perfect condition on the job, free from dirt and damage, ready for immediate use. Labels quickly identify contents . . . assure right quantity of the right hanger . . . make order filling simpler, more accurate.

Order Grinnell *Packaged* Pipe Hangers. Take advantage, too, of Grinnell's expert knowledge gained during more than 100 years of service in the piping field.

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FOR AIR, WATER, OIL,
NON-CORROSIVE LIQUIDS
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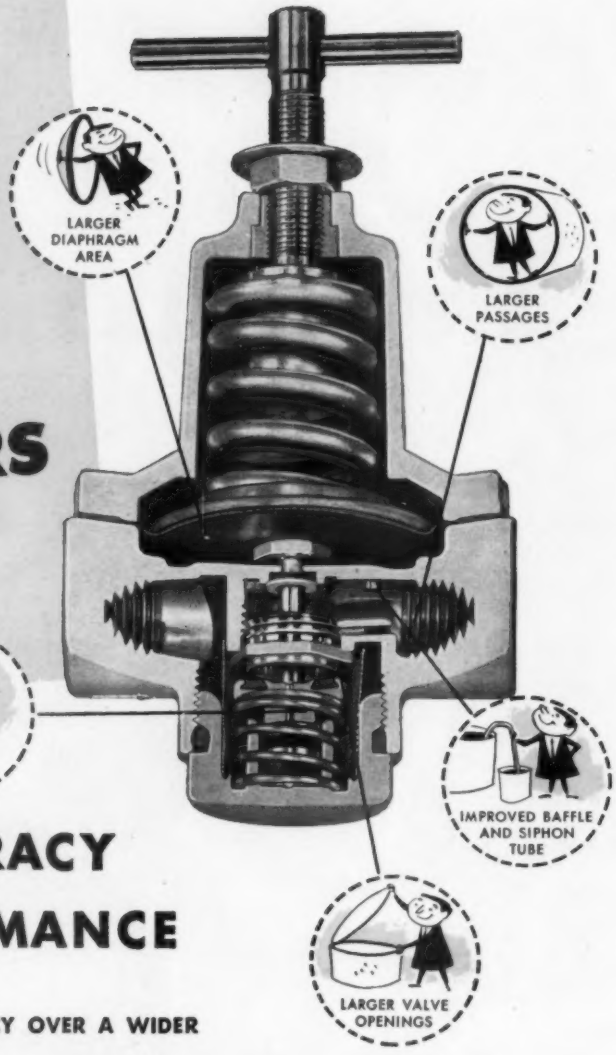

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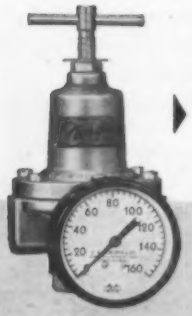

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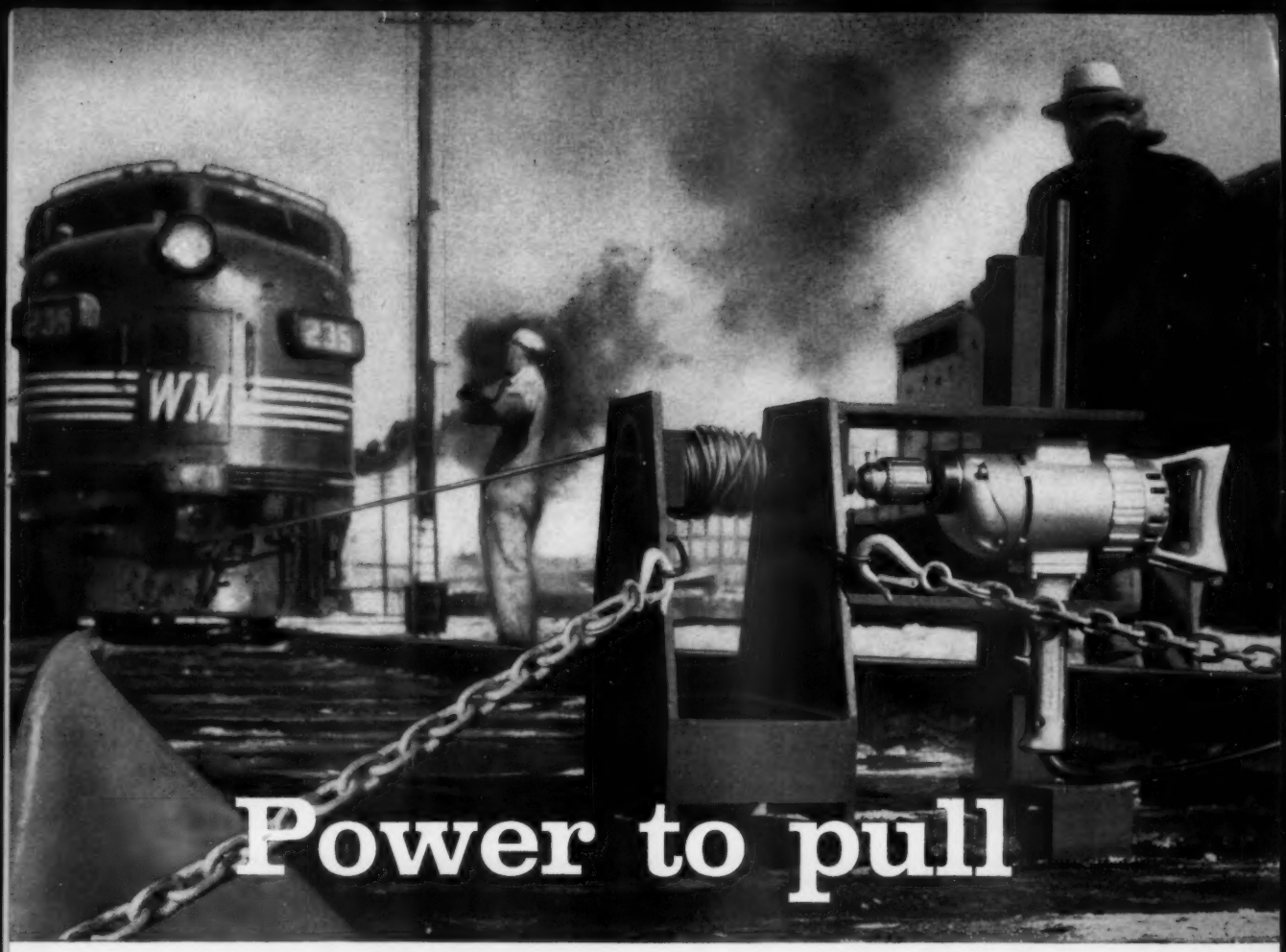


a locomotive!

...yet they handle light,

easy in any drilling job!

Read the exciting news about Black & Decker's new, pace-setting HEAVY-DUTY DRILLS!

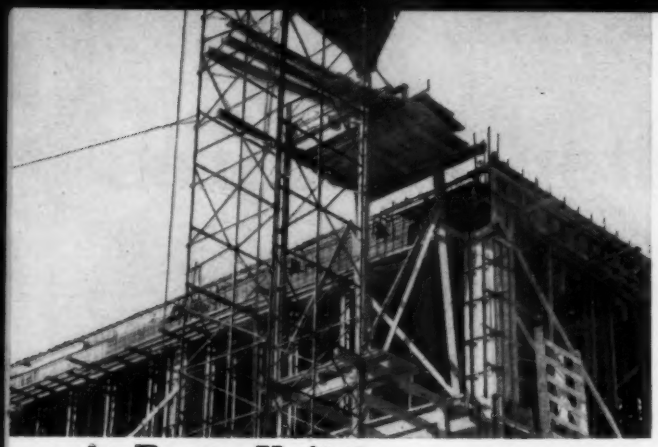
Proving Pace-Setting Power, new Black & Decker Heavy-Duty Drill—world's most powerful at rated capacity—can pull 115-ton Western Maryland R. R. Locomotive.

Drilling in Metal, these drills work faster, because their speed holds up under load. No need to go to heavier drills. You get the capacity you need with new Black & Decker Heavy-Duty Drills.

New Black & Decker® obsolete any

World's most powerful drills at their rated capacities!

New hi-torque Black & Decker-built motors give these heavy-duty drills amazing power for their size and weight. The ½" model, for example, has double its former power and torque, more power than most 1" drills. Result: drilling jobs go faster because these drills have the guts to hold their speed under load.



As Power Units, the compact Black & Decker Heavy-Duty Drills adapt for speed reducers, chain and winch hoists, light elevators, dumb-waiters, and scores of other applications.

Driving a Big Auger is a drill-killing job. Yet new Black & Decker Heavy-Duty Drills take it in stride. New, longer handles make them easier to control at maximum torque output.

Heavy-Duty Drills drills you've ever tried!

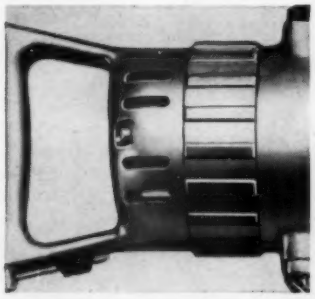
Full-power reversible feature built in at no extra cost!

New Black & Decker Heavy-Duty Drills have power to pull a locomotive—make rugged, compact power units—yet handle light and easy in any drilling job. That's because they're built to a new design concept that obsoletes all other drills of similar rated capacities. Here's why:

- **Brilliant, new B&D-built motors** give twice the power of their predecessors.
- **New reversible feature**—built in at no extra cost—gives full power in either direction.
- **New-type chuck** prevents slippage—can't come off when tool is reversed—yet is easily disassembled in seconds.
- **New handles** have been lengthened for easy control at maximum torque output.

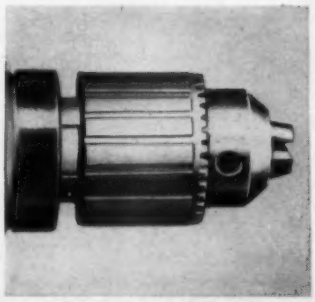
To speed your drilling—or as rugged Power Units!

These Black & Decker Heavy-Duty Drills have no match in industry today. You'll find them in ½", ⅝" and ¾" capacities at your nearby B&D distributor. Also 1" and 1¼" models available. Try them today—we guarantee you'll be amazed at the difference *modern* design has made in drills!



Completely reversible

First time in a heavy-duty drill—built in at no extra cost. With full power in either direction, reversible feature is operated by positive-action reversing switch ring shown here.



Exclusive, new-type chuck

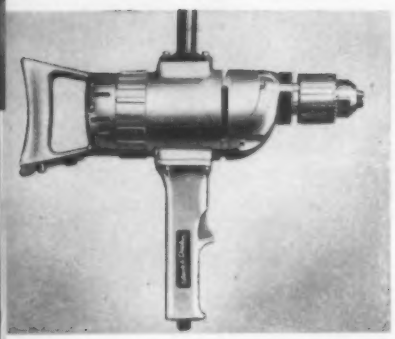
Positive drive taper mounted chuck can't slip in either direction. Easily disassembled, without a press. Operator can change chuck and convert tool to power unit in seconds.

Perfect operator control

Switch and side handles have been lengthened for perfect operator control at maximum torque output. And for all their power, these drills weigh only a shade over 16 lbs.

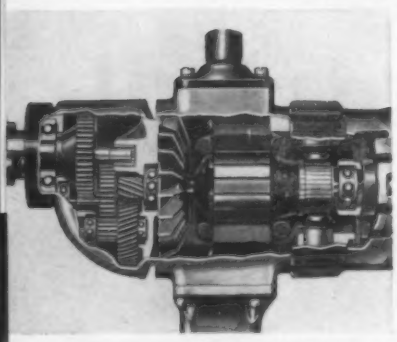
More Pace-Setter Features

. . . from the world's largest maker of portable electric tools!

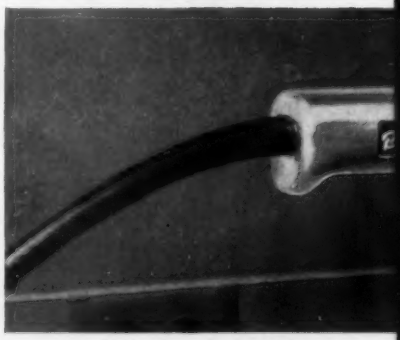


Sleek, streamlined design eliminates bulky appearance of old-fashioned drills. Makes tools more compact, easier to handle.

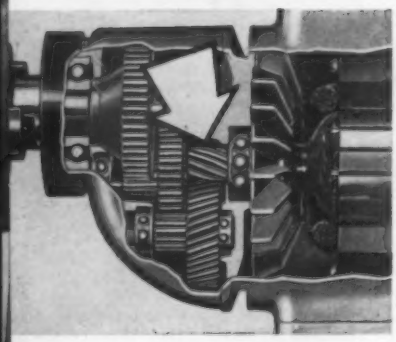
Instant-release trigger switch is mounted near end of switch handle for better operator control.



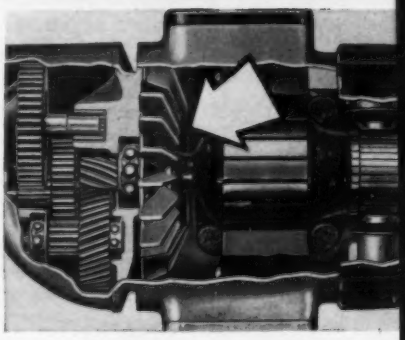
Full ball or needle bearings throughout give smoother, trouble-free operation.



Less chance of cord breakage because cord protector and clamp are molded in one piece. Cannot be pushed in, pulled out or twisted.



"Nitrided" hardened helical gears are used for maximum wearing qualities and performance.



For maximum air flow and cool operation, these new drills use centrifugal type, cast aluminum fan.

You be the judge!

Make a date with your B&D distributor for a free demonstration of these revolutionary Drills. See if you don't agree they top any drills you've ever tried—in power, reversibility, easy handling and sheer quality! For additional information, write to: THE BLACK & DECKER MFG. Co., Dept. 0804, Towson 4, Md., U.S.A. (In Canada: 80-86 Fleet St., E., Toronto 2, Ont.)

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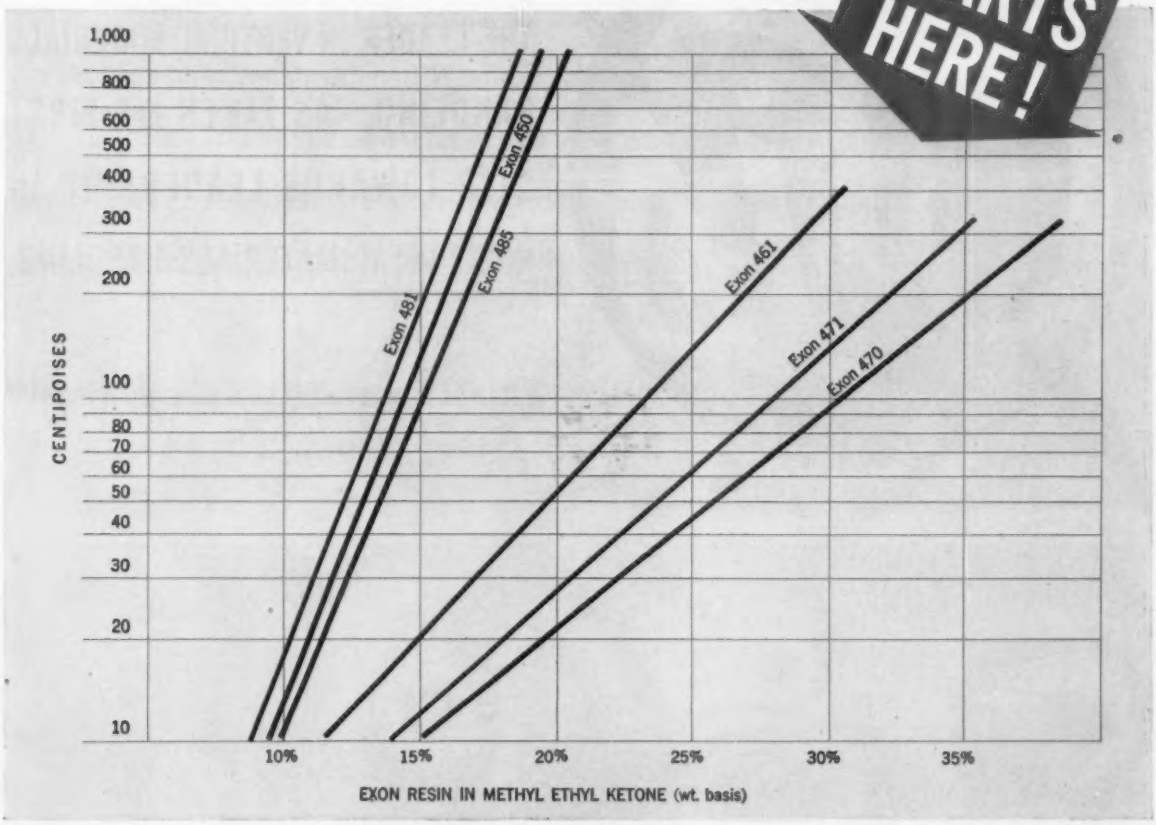
For more facts circle 507 on Reply Card

SUCCESS IN COATINGS STARTS HERE!



EXON CHARTS SOLUBILITIES to help you choose the resin with properties Pin-Pointed to your special needs!

EXON 450 Ideal for strip coatings. Good solubility, tensile strength and durability.

EXON 461 A unique fluorine-containing resin combining high solubility, unusual chemical resistance, heat stability and weatherability.

EXON 470 Excellent adhesion to metals, alkyd and vinyl surfaces. Compatible with wide range of drying oils, alkyds, phenolics, melamines. High solubility in inexpensive solvents.

EXON 471 Excellent for weatherability and durability in a protective coating. Corrosion resistant. No measurable change after sunlamp exposure for 360 hours as 1 mil film.

EXON 481 Makes possible colorful, abrasion-proof, washable coatings that resist fading or cracking.

EXON 485 For superior strip coatings. Lower viscosity makes application easier and shelf-life better. Good clarity.

Firestone

EXON

RESINS

THE special nature of Exon resins — "Pin-Pointed Properties" to supply specific answers to special needs — is particularly desirable in the manufacture of coatings.

Because products and processes vary, Firestone Exon has engineered 6 solution resins to help you formulate a successful coating. Each resin differs in properties, such as the solubility factor charted above, to suit various applications.

One property in common: superior quality of performance with the resultant production speed and savings which have made Firestone Exon industry's No. 1 source of specifically engineered vinyl resins.

We suggest you keep this chart handy—to help you put your finger on the right resin for *you* — at a glance.

For complete information and technical service, call or write:

CHEMICAL SALES DIVISION

FIRESTONE PLASTICS COMPANY, DEPT. 715F,
POTTSTOWN, PA.
A DIVISION OF THE FIRESTONE TIRE & RUBBER CO.

CHEMICAL PROGRESS WEEK APRIL 8-12

INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS

For more facts circle 508 on Reply Card

WORLD'S WORD FOR ELEVATOR QUALITY

OTIS ELEVATOR COMPANY, ALWAYS THE LEADER IN VERTICAL MATERIALS HANDLING, HAS TAKEN ITS FIRST STEP TOWARDS LEADERSHIP IN HORIZONTAL MATERIALS HANDLING.

THE BAKER-RAULANG COMPANY . . . .

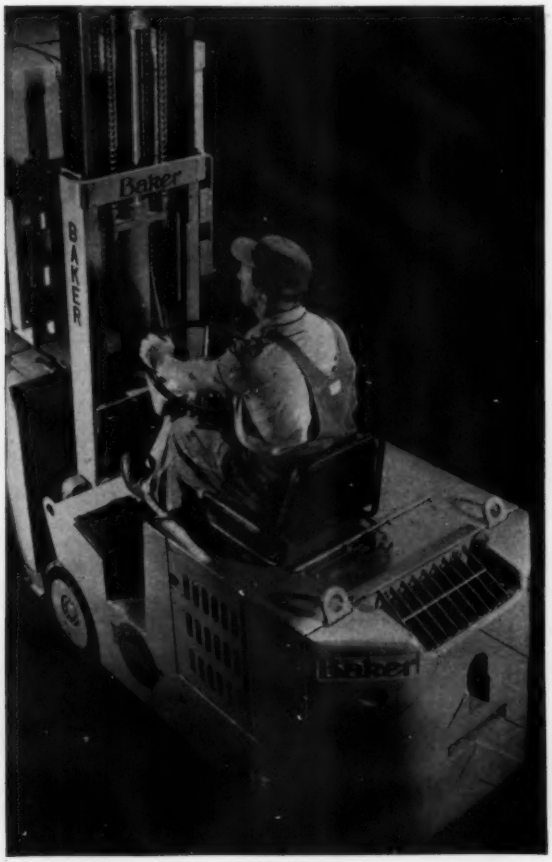
Among the products of The Baker-Raulang Company is the Traveloader, an entirely new concept in the field of mechanized handling of long, bulky loads. The Traveloader performs three distinct operations. It stacks like a fork truck, carries like a straddle truck, and delivers like a road truck. Gas or Diesel-powered Traveloaders are available in 6,000 to 30,000 pound capacities. A 4,000 pound capacity Electric-powered Traveloader with solid tires is available for indoor handling in narrow aisles.

OTIS has greatly expanded the engineering and research facilities of its recently acquired subsidiary, the BAKER-RAULANG COMPANY, Cleveland, Ohio. The product line has been broadened. It now includes a complete range of GAS and ELECTRIC Fork Trucks and an exclusive line of GAS and ELECTRIC side-loading Traveloader® Trucks, also Crane and Platform Trucks. You can now look to OTIS and BAKER for progress in horizontal materials handling.

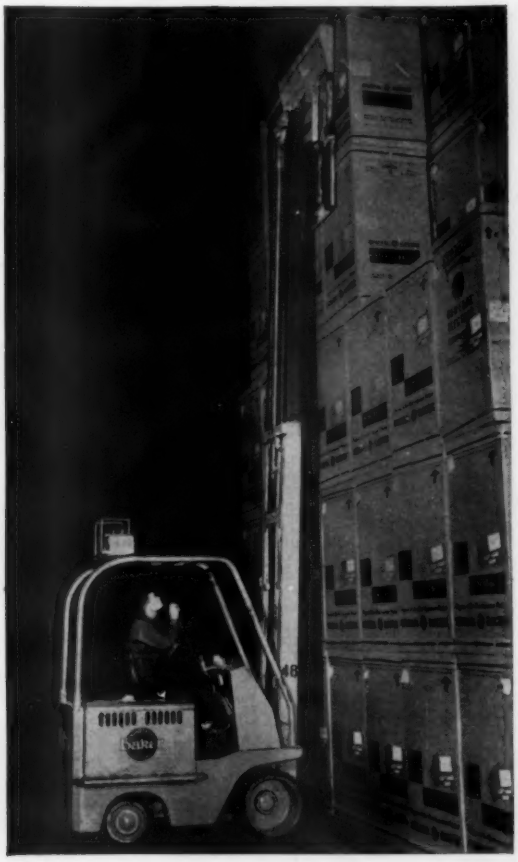
.... AN OTIS SUBSIDIARY, IS THE MAKER OF

Baker®

GAS AND ELECTRIC
industrial trucks



Baker's newest gasoline powered fork truck is available in many models, with capacities to 6,000 pounds. It features low initial cost, high lift, plus speed and economies of operation.



The battery-powered fork trucks in the Baker line range in capacity from 1,000 to 15,000 pounds. Baker was a pioneer in materials handling and has been producing electric industrial trucks for more than 35 years.

For more facts circle 509 on Reply Card

CALL THESE LOCAL GENERAL ELECTRIC DISTRIBUTORS FOR:

"OFF-THE-SHELF" DELIVERY OF

ALABAMA
BIRMINGHAM
Argo & Co., 57-4652
MOBILE
Turner Supply Co., HE 8-5581

ARIZONA
PHOENIX
Garrett Supply Co., AL 8-5701
General Elec. Supply Co., AL 8-6721
Graybar Elec. Co., AL 2-2371

ARKANSAS
CROSSETT
Tri-State Mill Supply Co., FO 4-4136
LITTLE ROCK
General Elec. Supply Co., FR 5-5328
Graybar Elec. Co., FR 5-1246
O'Bannon Bros., FR 2-2211
PINE BLUFF
Tri-State Mill Supply Co.,
Jefferson 4-9350

CALIFORNIA
BAKERSFIELD
Gough Industries, Inc., FA 5-5907
EMERYVILLE
General Elec. Supply Co., OL 3-4433
FRESNO
Electric Motor Shop, AD 3-1154
LOS ANGELES
California Wholesale Elec. Co.,
RA 3-7131
General Elec. Supply Co., MA 5-7141
Gough Industries, Inc., MA 6-2474
Graybar Elec. Co., AN 3-7282
Shields, Harper & Co., LO 8-4931
W. W. Grainger, Inc., AN 3-6928
MAYWOOD
Mitchell Elec. Equip. Co., LU 3-4818
NORTH HOLLYWOOD
Dyer's Elec. Supply, Inc., PO 5-5434
OAKLAND
California Elec. Co., OL 5-6100
REDDING
Gerlinger Steel & Supply Co., 2330
SACRAMENTO
Capital Machine & Welding Works, Inc.,
GI 3-2556
General Elec. Supply Co., GI 3-9001
SAN FRANCISCO
General Elec. Supply Co., UN 3-4000
SAN JOSE
General Elec. Supply Co., CY 7-1008
STOCKTON
General Elec. Supply Co., HO 5-7231
Guntert & Zimmerman Sales Div., Inc.,
HO 4-8712
UKIAH
Klamath Machine & Loco. Wks.,
HO 2-6578
VAN NUYS
So-Cal Equip. & Supply Co., ST 5-5431

COLORADO
COLORADO SPRINGS
Graybar Elec. Co., 4-3701
DENVER
General Elec. Supply Co., AM 6-0671
Graybar Elec. Co., TA 5-7111
Hendrie & Bolthoff Co., KE 4-4111
GRAND JUNCTION
General Elec. Supply Co., CH 2-5024
PUEBLO
Johnson Elec. Co., LI 3-1746

CONNECTICUT
BRIDGEPORT
Electric Maintenance Service Co., Inc.,
ED 3-6163
General Elec. Supply Co., FO 8-1621
MERIDEN
Connecticut Elec. Equip. Co., Inc.,
BE 5-6383
NEW BRITAIN
Spring & Buckley, Inc., BA 9-2012
STAMFORD
Palmer's Elec. Machine and Foundry,
FI 8-7378
WATERBURY
Electric Motor Repair Co., Inc.,
PL 3-2119
WEST HARTFORD
Graybar Elec. Co., AD 3-2631

DELAWARE
WILMINGTON
Artcraft Elec. Supply Co., OL 6-6651
General Elec. Supply Co., OL 5-5561

DISTRICT OF COLUMBIA
WASHINGTON
General Elec. Supply Co., HU 3-6800

10 REASONS WHY G-E TRI 55 CLAD MOTORS ARE PREFERRED BY INDUSTRY

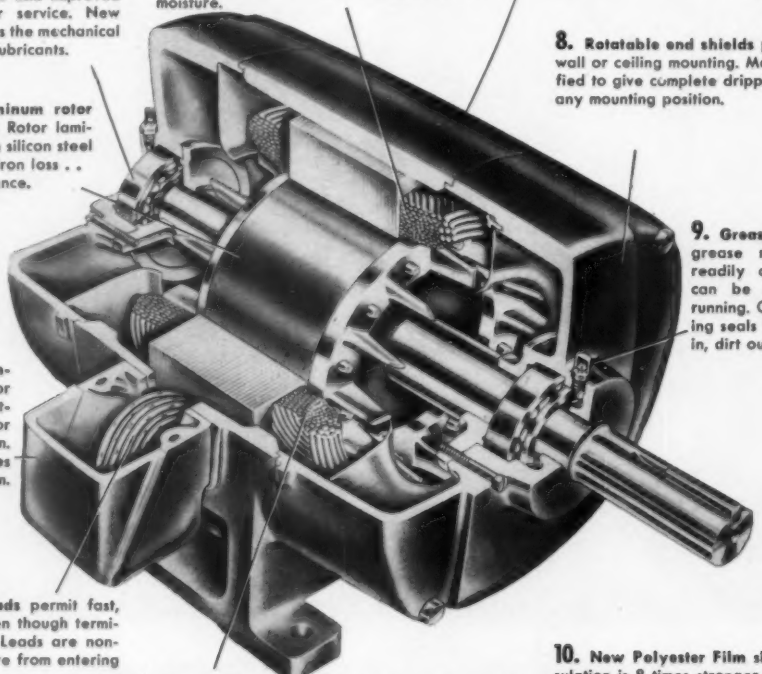
1. **New advanced bearing system** utilizing oversize bearings and improved lubricant provide longer service. New bearing grease has 8 times the mechanical stability of conventional lubricants.

2. **One-piece, cast aluminum rotor** is virtually indestructible. Rotor laminations of non-aging, high silicon steel are annealed to reduce iron loss . . provide uniform performance.

3. **Diagonally split conduit box** facilitates motor hook-up. Box can be rotated to any of 4 positions for complete wiring freedom. Diagonal design provides plenty of "knuckle" room.

4. **Perma-numbered leads** permit fast, positive identification even though terminals have been clipped. Leads are non-wicking to prevent moisture from entering motor interior.

5. **Stator assembly** is coated with Silicone Dri-film® for water resistance. New non-hygroscopic insulation materials virtually eliminate insulation failure due to moisture.



6. **Formex®** wire used in stator coils provides high dielectric strength. Formex offers protection against heat aging and full-voltage starting stress.

7. **Cast-iron frame** and end shields provide greater rigidity and strength, prevent motor from twisting out of line. Ribbing along bottom of motor adds extra strength.

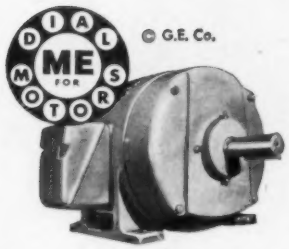
8. **Rotatable end shields** permit either side wall or ceiling mounting. Motor can be modified to give complete dripproof protection in any mounting position.

9. **Grease fittings** and grease relief plugs are readily accessible. Motor can be regreased while running. Close fitting bearing seals help keep grease in, dirt out.

10. **New Polyester Film** slot and phase insulation is 8 times stronger than ordinary insulations. Insulation offers high dielectric and mechanical strength to lengthen motor life.

G-E TRI-CLAD 55 MOTORS

REG U.S. PAT. OFF.



FLORIDA
JACKSONVILLE
General Elec. Supply Co., EL 3-9011
Turner Elec. Works, EL 3-3661
MIAMI
General Elec. Supply Co., NE 5-1361
Gondas Corp., FR 4-1745
TAMPA
General Elec. Supply Co., 2-1805
Raybro Elec. Supplies, Inc., 2-1921

GEORGIA
ATLANTA
Cleveland Elec. Co., JA 4-8422
General Elec. Supply Co., MU 8-3811
AUGUSTA
Electrical Equip. Co., 2-6686
General Elec. Supply Co., 6-8422
CAIRO
Harrison & Ellis Co., 2-4482
ROME
Battey Machinery Co., 2-2421
VALDOSTA
Valdosta Armature Works, 1732

IDAHO
BOISE
General Elec. Supply Co., 4-5541
PARMA
Transmission Products, Div. of Parma Water Lifter Co., 2-2611

ILLINOIS
CHICAGO
Complete Elec. Supply Co., WA 8-8022
Excel Elec. Service Co., VI 7-7220
General Elec. Supply Co., WA 2-5656
Graybar Elec. Co., Inc., CA 6-4100
Hawkins Elec. Co., HA 1-8070
Metropolitan Elec. Supply Co., ST 2-4930
W. W. Grainger, SE 8-3844
EAST ST. LOUIS
Illinois Elec. Works, UP 5-4321
PEORIA
Graybar Elec. Co., 6-0765
ROCKFORD
Electric Apparatus Co., 5-4170
General Elec. Supply Co., 5-0551
SPRINGFIELD
General Elec. Supply Co., 3-4509
Graybar Elec. Co., 8-0484
STERLING
Crescent Elec. Supply Co., 2674

INDIANA
EVANSVILLE
General Elec. Supply Co., HA 5-2655
Swanson Nunn Elec. Co., HA 5-3321
FORT WAYNE
General Elec. Supply Co., HA 3243
Nussbaum Elec. Co., AN 2252
HAMMOND
General Elec. Supply Co., WE 1-5155
Graybar Elec. Co., TI 4-7800
INDIANAPOLIS
General Elec. Supply Co., ME 4-8443
LAFAYETTE
General Elec. Supply Co., 2-0081
MUNCIE
General Elec. Supply Co., AT 4-6391
SOUTH BEND
Koontz-Wagner Elec. Co., Inc., CE 3-8251

IOWA
BURLINGTON
Crescent Elec. Supply Co., PL 2-3631
CEDAR RAPIDS
Crescent Elec. Supply Co., 3-9601
DAVENPORT
Crescent Elec. Supply Co., 3-1811
Graybar Elec. Co., 3-2767
DES MOINES
Electrical Engrg. & Equip. Co., AT 2-0431
General Elec. Supply Co., AT 8-7401
DUBUQUE
Crescent Elec. Supply Co., 3-6411
WATERLOO
Crescent Elec. Supply Co., AD 4-6866

KANSAS
KANSAS CITY
General Elec. Supply Co., MA 1-3700
PITTSBURG
Atkinson Armature Works, 1754
SALINA
Mid-States Armature Works, TA 3-2890
WICHITA
General Elec. Supply Co., AM 5-0627

KENTUCKY
LOTHAIR
Mine Service Co., 239
LOUISVILLE
General Elec. Supply Co., ME 7-3651
Marine Elec. Co., Inc., JU 4-7176

LOUISIANA
ALEXANDRIA
Brown Roberts Elec. Co., Inc., 3-7281
BATON ROUGE
General Elec. Supply Co., 7-7586
NEW ORLEANS
General Elec. Supply Co., GA 5771
Graybar Elec. Co., CA 6263
New Orleans Armature, CA 9566
Standard Supply and Hardware Co., Inc., CA 6641
SHREVEPORT
General Elec. Supply Co., 4-1436

MAINE
PORTLAND
General Elec. Supply Co., SP 2-3721
WESTBROOK
Stultz Electric Works, UL 4-2501

MARYLAND
BALTIMORE
General Elec. Supply Co., LE 9-3565
Graybar Elec. Co., DI 2-5500
HAGERSTOWN
General Elec. Supply Co., RE 3-1331
Hagerstown Equip. Co., RE 3-7600

MASSACHUSETTS
BOSTON
General Elec. Supply Co., AL 4-5300
Graybar Elec. Co., KE 6-4567
Sandman Elec. Co., HI 2-7600
FITCHBURG
Service Elec. Supply Co., 3-4811
Shepard & Parker Co., 3-3907
LOWELL
White Elec. Motors, GL 8-6336
LYNN
Des Roberts Elec. Supply Co., 5-0015
SPRINGFIELD
Associated Elec. Co., RE 9-1078
General Elec. Supply Co., RE 4-8255
WORCESTER
General Elec. Supply Co., PL 6-4351

MICHIGAN
BATTLE CREEK
Mid-States Elec. Supply, Inc., WO 3-6635
DETROIT
General Elec. Supply Co., TR 5-9400
Graybar Elec. Co., TO 8-5550
Miller-Seldon Elec. Co., TY 4-3800
Spaulding Elec. Co., WO 2-6200
FLINT
General Elec. Supply Co., SU 9-9101
GRAND RAPIDS
Clement Elec. Distributing Co., GL 6-7271
Graybar Elec. Co., GL 1-2701
JACKSON
Electric Wholesale Supply Co., 2-7123
KALAMAZOO
General Elec. Supply Co., 3-2645
LANSING
Barker-Fowler Elec. Co., IV 4-4406
General Elec. Supply Co., IV 7-5401
Graybar Elec. Co., IV 7-5075
MUSKEGON
Fitzpatrick Elec. Supply Co., 2-6621
SAGINAW
General Elec. Supply Co., PL 3-6474

MINNESOTA
DULUTH
Graybar Elec. Co., RA 2-6685
MINNEAPOLIS
Lakeland Engr. Equip. Co., FE 8-7531
Sterling Elec. Co., FE 2-4571
ST. PAUL
General Elec. Supply Co., MI 5-2761

MISSISSIPPI
JACKSON
Power Elec. Co., 5-8361

MISSOURI
JOPLIN
General Elec. Supply Co., MA 4-5622
KANSAS CITY
Graybar Elec. Co., BA 1-1644
Independent Elec. Machinery Co., GR 1-2610
ST. LOUIS
General Elec. Supply Co., JE 1-3000
Graybar Elec. Co., JE 1-4700

MONTANA
BILLINGS
General Elec. Supply Co., 9-4559

NEBRASKA
OMAHA
General Elec. Supply Co., JA 0456
Graybar Elec. Co., WE 7676
Schneider Elec. & Equip. Co., WE 5550

NEVADA
RENO
Linnecke Elec. Sales Co., 3-3729

NEW HAMPSHIRE
MANCHESTER
General Elec. Supply Co., NA 5-5418

NEW JERSEY
CAMDEN
National Elec. Supply Co., EM 5-4330
NEWARK
General Electrical Equip. Co., BI 2-2305
General Elec. Supply Co., BI 2-1600
Graybar Elec. Co., MA 2-5100
NEW BRUNSWICK
A. Bishop Elec. Motor Exchange, KI 5-6446
PATERSON
General Electric Supply Co., LA 5-5100
Reliable Elec. Motor Repair Co., AR 4-7756
Watson-Flagg Sales Corp., LA 5-2324
TRENTON
General Elec. Supply Co., OW 5-3453
Thropp Elec. Sales Corp., JU 7-1441
WOODBURY
Industrial Pump and Supply Co., TI 5-7030

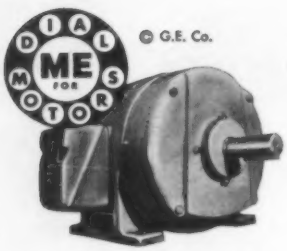
NEW MEXICO
ALBUQUERQUE
Electric Service Inc., 2-9447
General Elec. Supply Co., 2-5246

NEW YORK
ALBANY
Graybar Elec. Co., 5-1563
Havens Elec. Co., Inc., 4-1201
BROOKLYN
Apparatus Distributor, Inc., UL 2-4000
BUFFALO
General Elec. Supply Co., EL 5100
Graybar Elec. Co., WA 3700
ELMIRA
LeValley McLeod, Inc., 6163
GLENS FALLS
Glens Falls Elec. Supply Co., Inc., 2-5868
JAMAICA
Central Queens Elec. Supply Corp., RE 9-2020
LONG ISLAND CITY
Graybar Elec. Co., EX 2-2000
Motors & Armatures Inc., EX 2-3523
NEW YORK
Electric Motors Corp., CA 6-4665
General Elec. Supply Co., AL 5-3300
Hudson Elect. Sales Co., Inc., WO 2-3041
W. W. Grainger, Inc., CA 6-3810
POUGHKEEPSIE
Electra Supply Co., Inc., GL 2-9000
ROCHESTER
Electric Equip. Co., Div. Norry Elec. Co., GL 3-6070
General Elec. Supply Co., GR 3-5200
T. H. Green Elec. Co., HA 6-9840
SYRACUSE
M. H. Salmon Elec. Co., Inc., 73-3325
TROY
Tri-State Elec. Motors, Inc., AS 2-4250
UTICA
Langden & Hughes Elec. Co., Inc., 4-3154
Mather, Evans & Diehl Co., Inc., 4-6165

NORTH CAROLINA
ASHEVILLE
General Elec. Supply Co., 2-4481
CHARLOTTE
Armature Winding Co., ED 3-2158
General Elec. Supply Co., FR 5-5761

More G-E Distributors on next page . . .

GENERAL ELECTRIC



CALL THESE LOCAL DISTRIBUTORS FOR:

OFF-THE-SHELF DELIVERY OF G-E TRI-CLAD MOTORS

(Continued from preceding page)

FAYETTEVILLE
General Elec. Supply Co., 2-5143
GREENSBORO
General Elec. Supply Co., 3-8207
GREENVILLE
General Elec. Supply Co., 5104
LAURINBURG
Electrical Equipment Co., 1196
RALEIGH
Electrical Equipment Co., TE 2-2039
General Elec. Supply Co., TE 3-4691

OHIO

AKRON
General Elec. Supply Co., FR 6-8195
Graybar Elec. Co., JE 5-4143
CANTON
General Elec. Supply Co., GL 4-5187
Jackson Bayley Elec. Co., GL 5-9421
CINCINNATI
General Elec. Supply Co., EL 1-2810
Graybar Elec. Co., MA 1-0600
CLEVELAND
Elliott Elec. Co., TO 1-2454
General Elec. Supply Co., HE 1-7280
Graybar Elec. Co., Inc., HE 2-2500
Strong, Carlisle & Hammond Co., TO 1-8800
COLUMBUS
General Elec. Supply Co., AX 9-1161
Graybar Elec. Co., CA 8-3811
Loeb Electric Co., AX 9-1142
DAYTON
General Elec. Supply Co., MI 0781
Graybar Elec. Co., MI 5665
HAMILTON
Wente Elec. Co., TW 4-8128
PORTSMOUTH
Genera Elec. Supply Co., EL 3-3196
TOLEDO
General Elec. Supply Co., Cherry 4-8661
Graybar Electric Co., EX 1641
YOUNGSTOWN
Economy Elec., Riverside 4-4461
General Elec. Supply Co., Riverside 6-6511
Graybar Elec. Co., Riverside 4-0124

OKLAHOMA

TULSA
General Elec. Supply Co., LU 4-2491
Graybar Elec. Co., MA 6-2121

OREGON

COOS BAY
Marshfield Elec. Co., Congress 7-6319
EUGENE
American Steel & Supply Co., 5-0373
MEDFORD
General Elec. Supply Co., 3-4519
PORTLAND
Eoff Elec. Co., CA 2-9411
General Elec. Supply Co., CA 7-0651
Graybar Elec. Co., CA 7-6641
Holt & O'Donnell, CA 8-0753
ROSEBURG
Industrial Elec. Service Co., OR 3-6658

PENNSYLVANIA

ALLENTOWN
Allen Elec. Co., Inc., HE 5-9515
General Elec. Supply Co., HE 3-5206
BRADFORD
Bovaird and Co., 7141
DREXEL HILL
General Elec. Supply Co., CL 9-6440
ERIE
General Elec. Supply Co., 2-1477
INDIANA
National Mines Serv. Co., 5-5655
JOHNSTOWN
General Elec. Supply Co., 7-5101
PHILADELPHIA
A. J. Lacourse, MA 7-1895
Electrical Repairs and Sale of Machinery, WA 2-2241
Jos. T. Fawkes & Co., WA 2-2241
General Elec. Supply Co., GA 6-8800
Graybar Elec. Co., WA 2-5405
PITTSBURGH
General Elec. Supply Co., FA 2-1530
Graybar Elec. Co., Inc., FA 2-4100
READING
General Elec. Supply Co., 5-8424
SCRANTON
General Elec. Supply Co., DI 4-8562
WESTCHESTER
Westchester Elec. Supply Co., OW 6-4722
WILKES-BARRE
General Elec. Supply Co., VA 2-5106

RHODE ISLAND

PAWTUCKET
New England Elec. Supply Co., 5-7400
PROVIDENCE
General Elec. Supply Co., GA 1-6523
J & H Elec. Co., GA 1-7840

SOUTH CAROLINA

ANDERSON
Woodward-Stephens Co., Inc., CA 5-2501
GREENVILLE
J. W. Vaughan Co., 2-2421
SUMTER
Sumter Machinery Co., SP 3-7321

SOUTH DAKOTA

ABERDEEN
McLaughlin Elec. Supply House, 4911
RAPID CITY
Crescent Elec. Supply Co., FI 2-7913

TENNESSEE

CHATTANOOGA
Electric Motor Sales & Supply Co., MA 9-7361
Graybar Elec. Co., 4-3351
COLUMBIA
Middle Tenn. Armature Wks., EV 8-3672
MEMPHIS
Graybar Elec. Co., BR 8-7150
Tri-State Armature & Elec. Wks., JA 7-8414
NASHVILLE
Industrial Sales Co., Inc., AL 4-3508
Nashville Armature Wks., AL 6-2546

TEXAS

ABILENE
Graybar Elec. Co., OR 2-2861
AMARILLO
General Elec. Supply Co., DR 6-7255
Graybar Elec. Co., DR 2-6778
AUSTIN
Graybar Elec. Co., Greenwood 8-5674
BEAUMONT
General Elec. Supply Co., TE 3-6435
CORPUS CHRISTI
Bradley Motor and Armature Works, TU 2-8891
General Elec. Supply Co., TU 2-9237
DALLAS
General Elec. Supply Co., RI 2-2201
W. M. Smith Elec. Co., HA 8-4606
EL PASO
General Elec. Supply Co., 3-3407
Graybar Elec. Co., 3-7561
FORT WORTH
General Elec. Supply Co., ED 2-5385
Graybar Elec. Co., ED 5-4525
HOUSTON
Buffalo Elec. Co., CA 8-4431
General Elec. Supply Co., FA 3-3121
Graybar Elec. Co., CA 8-4571
Oliver Armature Works, CA 2-9271
LUBBOCK
General Elec. Supply Co., PO 3-8271
MIDLAND
I. W. Hynd Co., MU 4-5501
SAN ANTONIO
General Elec. Supply Co., CA 7-1261
Graybar Elec. Co., Inc., CA 7-9246
San Antonio Machine and Supply Co., CA 5-1651
United Elec. Co., Pershing 4-3141
TYLER
General Elec. Supply Co., 2-1673
VICTORIA
Electric Machine & Supply, HI 3-7604
WACO
General Elec. Supply Co., 2-1611
WICHITA FALLS
Electric Motor Co. Div., United Elec. Co., 7-8333

UTAH

SALT LAKE CITY
General Elec. Supply Co., EM 3-3911
Graybar Elec. Co., EL 9-8771
Refrigeration Distributors Corp., DA 2-5886

VIRGINIA

NORFOLK
General Elec. Supply Co., MA 2-7183
ROANOKE
General Elec. Supply Co., 3-1564
Graves Humphries Inc., 3-8011
Graybar Elec. Co., 3-3614
RICHMOND
Electrical Equip. Co., 7-2647
General Elec. Supply Co., 6-4941

WASHINGTON

SEATTLE
General Elec. Supply Co., SE 6400
Graybar Elec. Co., Inc., MU 0123
SPOKANE
General Elec. Supply Co., KE 0431
Graybar Elec. Co., Inc., EM 6611
TACOMA
General Elec. Supply Co., BR 8454

WEST VIRGINIA

BLUEFIELD
Bluefield Supply Co., DA 5-6131
CHARLESTON
Virginian Elec. Inc., 6-0631
HUNTINGTON
Virginian Elec. Inc., 2-8396
LOGAN
Logan Hardware & Supply Co., 710
WHEELING
General Elec. Supply Co., 2555

WISCONSIN

APPLETON
General Elec. Supply Co., RE 4-7155
GREEN BAY
Beemster Electric Co., HE 7-3238
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Crescent Elec. Supply Co., AL 6-5441
Elec. Motor Service, AL 6-6724
MILWAUKEE
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Graybar Elec. Co., BR 6-8400
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Snapp Elec. Co., 2-1031

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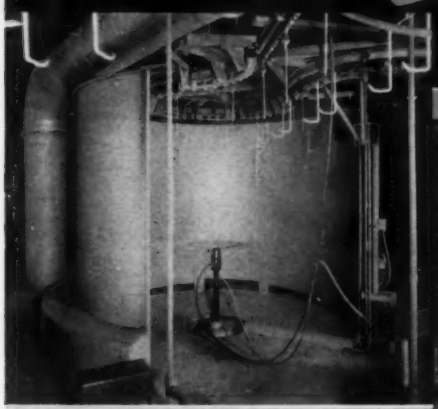
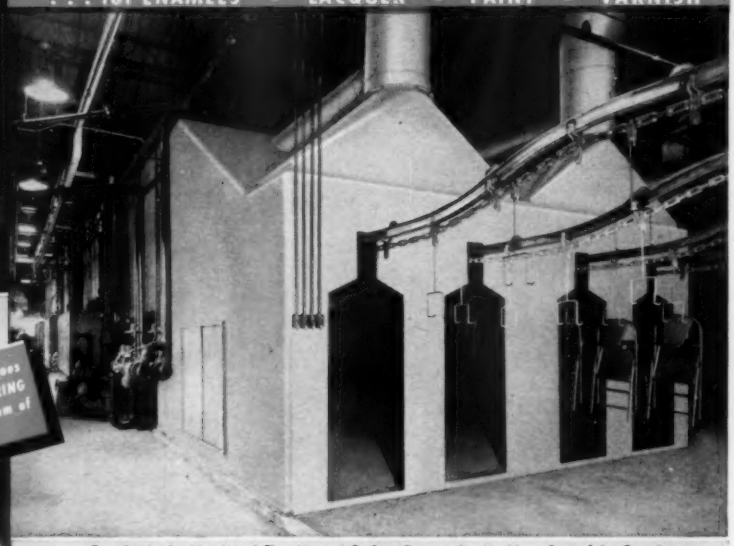
COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH



One of the Eight Mahon Ventilated, Circular Electro-Spray Enclosures Employed in the Four Separate Painting Facilities in this System. Note Provisions for Control of Air Movement.



Four-Production-Line Metal Cleaning and Surface Preparation Machine—Part of the Complete Mahon Finishing System in the Durham Manufacturing Corporation's Plant, Muncie, Indiana.

One of the Four Separate Painting Units in this System. Each of the Four Production Lines Passes through an Identical Arrangement —Two Electro-Spray Enclosures and Staggered Touch-up Booth.

Ramp-Tunnel to Finish Baking Oven on Roof. Both Ramp and Oven Accommodate Four Parallel Conveyor Lines in One Straight-through Pass. Equipment is Divided with Two Lines on Each Side. Either Side can be Operated Independently.

Complete NEW FINISHING SYSTEM Provides FLEXIBILITY and Greatly Increased PEAK PRODUCTION CAPACITY!

A new and highly efficient Mahon Finishing System at Durham Manufacturing Corporation, Muncie, Indiana, gives management needed flexibility and greatly increased maximum painting production capacity. Four parallel painting production lines pass through the entire system. The Metal Cleaning and Surface Preparation Equipment, Dry-Off Oven, Cooling Tunnel and Finish Baking Oven are designed to accommodate four parallel conveyor lines. Each of the four conveyor production lines passes through one of four separate painting equipment arrangements—each of which includes two circular electro-spray enclosures and a staggered, touch-up Spray Booth. The entire System is designed so that two of the painting production lines can be shut down—the processing equipment is divided for this purpose. An ultramodern Finishing System of this type provides a manufacturer like Durham with painting equipment which will meet peak production demands and still permit operation at 50% capacity with the same efficiency and economy. If you are contemplating new finishing equipment, you, too, will want to discuss methods, equipment requirements and possible production layouts with Mahon engineers . . . you'll find them better qualified to advise you, and better qualified to do the all-important planning, engineering and coordinating of equipment. See Sweet's Plant Engineering File for information, or write for Catalogue A-657.

THE R. C. MAHON COMPANY • Detroit 34, Michigan

SALES-ENGINEERING OFFICES in DETROIT, NEW YORK and CHICAGO

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

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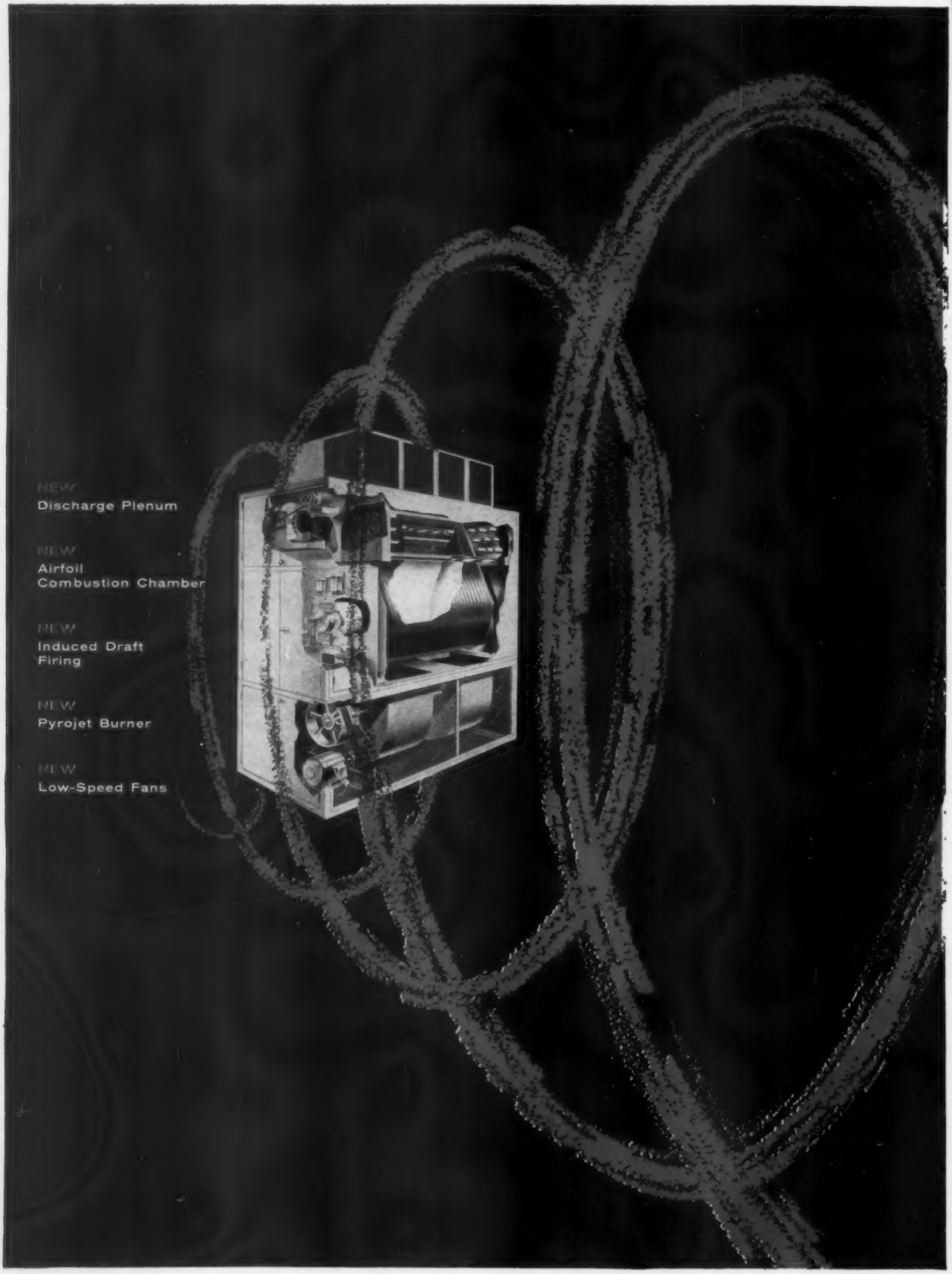
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Low-Speed Fans

Dravo presents: the first dual-fuel burner designed specifically for direct-fired heaters

PYROJET *burner tops list of features in all-new Dravo Counterflo heater*

Intensive research by Dravo engineers has resulted in the development of the first dual-fuel burner specifically designed for use in a direct-fired space heater. This burner, the PYROJET, burns light oil, heavy No. 5 oil, or gas with equal efficiency. The combination gas/light oil models feature automatic switchover with *no manual adjustment*. Here are some of the outstanding features of the Dravo PYROJET burner.

- Totally induced draft assures highest combustion efficiency
- Positive ignition of No. 5 oil provided by new dual pre-heater . . . another Dravo exclusive
- Automatic switchover on light oil/gas combination models . . . no manual adjustment
- Ring and finger design minimizes adjustment and service problems
- Combination of zero governor and gas-air premix block assures gas pilot stability
- Control options: on-off, hi-low-off, or full range modulation

Setting new standards of efficiency and convenience, the PYROJET burner is a major part of the entirely new concept of combustion achieved in the all-new Dravo *Counterflo* heater. The stainless steel, airfoil combustion chamber, the new induced draft system, the electronic controls, all contribute to make the new Dravo heater the most economical and flexible space heater available.

Write today for full information on this remarkable new Dravo heater. There is a size and type for every heater application—for economical space heating—for process heating—for tempering make-up air as a duct furnace and for a host of other applications. Address Dravo Corporation, Pittsburgh 22, Pennsylvania.

Ask for Bulletin 564-34

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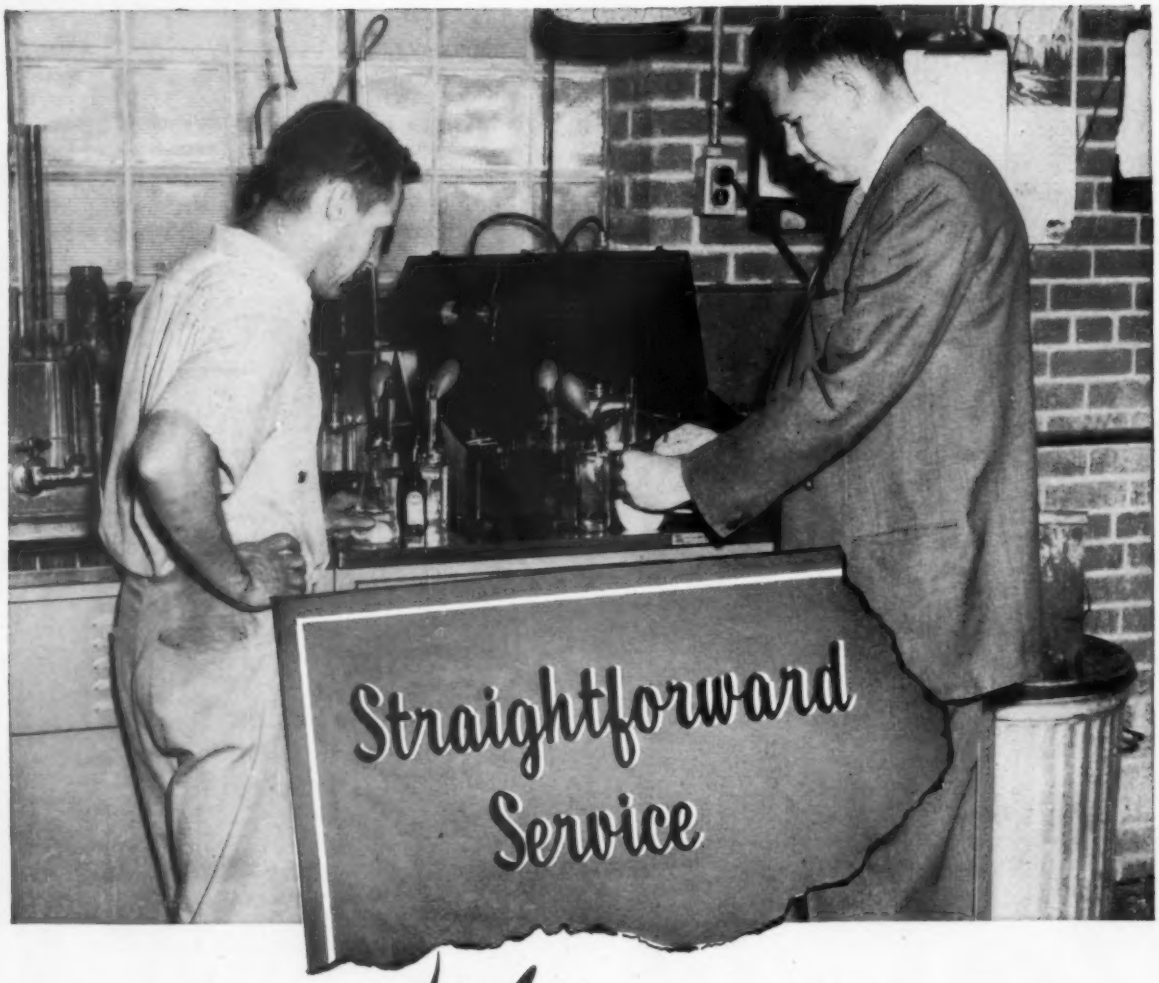

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A paper on "A Laboratory Method for the Study of Steam Condensate Corrosion Inhibitors," presented at the 8th Annual Conference, National Association of Corrosion Engineers, has been reprinted by Nalco for distribution to men interested in this problem. Your copy will be sent free upon request.

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BULLETINS just released and of immediate plant interest

VALVES, PIPING, FITTINGS

101 Steam Pressure Valve—Bulletin 981 describes company's Standard Type 44 pilot operated pressure reducing and regulating valve —a piston operated, single seat valve for accurate pressure control of steam under varying load conditions. Information includes photo and cross-sectional diagram of the valve, specifications, pressure and temperature ratings, capacity chart. A. W. Cash Co.

102 Bronze, Steel Valves—Catalog 200, 80 pp, describes company's line of bronze and steel valves, including globe, angle, gate, Flocontrol and other types applicable to power, petroleum, chemical and general industry installations. Engineering data such as material specifications, flow charts, temperature and pressure ratings are included. Catalog is profusely illustrated with photos, cutaway views and dimensional drawings. It is available to qualified plant engineers. Please state your job title. Manning, Maxwell & Moore, Inc.

103 Hydraulic Valves—Entitled "High Pressure Hydraulic Valves," this 8-pp brochure lists and describes 24 different styles of company's valves for hydraulic systems, ranging from 1500 to 20,000 psi in working pressure. It covers check valves, stop valves, operating valves and special purpose types. All similar valves are listed under single headings, and sizes available, working pressures and type of metal construction for every valve indicated. R. D. Wood Co.

104 Float Valves—Sixteen-pp Bulletin W-5 explains features of company's cushioned float valves designed to maintain accurate water level control in elevated tanks, coagulating basins, mixing chambers. They are for cold or hot water service, in quick opening or throttling design. Parts list, dimensions, and shipping weights are given for the various sizes. Operation and installation data are included. Golden-Anderson Valve Specialty Co.

105 Pipe Fittings—This 8-pp brochure describes a self-sealing pipe fitting designed to eliminate pipe connection leaks. A three-step diagram shows how the fitting is installed. In addition to covering uses and applications of the fitting, bulletin contains questionnaire concerning ideal specifications for such a fitting. Those who answer this questionnaire and send it to company will receive tabulated results. Tru-Seal Div., Flick-Reedy Corp.

INSTRUMENTS, CONTROLS

106 Meters, Valves, and Regulators—Catalog C-5000 Rev 8, 28 pp, includes photo-illustrated descriptions of the recently introduced telapilot—with power pilot loading by remote control— and the Hypregun, a compact, efficient air-operating valve lubricant gun. The catalog also includes completely revised valve specifications. Meter and Valve Div., Rockwell Mfg. Co.

107 On Meter Buying—The 1957 Meter Buyers' Guide—Bulletin GEC-1400, 64 pp—covers all essential information on company's single-phase, polyphase and watthour demand meters, as well as water heater time switches and meter sockets. Complete specifications, ratings, application diagrams, dimensional diagrams, photos and cutaway view illustrating features are included. General Electric Co.

108 Instruments, Relays—Bulletin 3042 is an 8-pp condensed catalog covering electronic components, temperature monitoring systems, anod others. Provides application suggestions and specifications. Also includes data on stock model time delay relays. Instrument Div., Thomas A. Edison, Inc.

109 Pneumatic Control Stations—Eight-pp Bulletin 1031 describes new auto-manual pneumatic loading stations of non-seal type. The mechanisms are suitable for components in combustion control, feed water regulation, pressure-reduction systems, desuperheating stations and other regulation and control duties in steam power plants. Both standard size and miniature devices are described. Copes-Vulcan Div., Blaw-Knox Co.

110 Pneumatic Computing Relay—Four-pp Product Specification P99-3 describes features, application, operating characteristics of a computing relay for pneumatic control systems. Explains proportional, reset, and rate control actions, and provides equations of computing actions. Bailey Meter Co.

111 On Venturi Tubes—Design features, dimensional data, capacity tables, recovery tables and similar information on venturi tubes are included in Bulletin 110-N1. Describes standard, fabricated, and non-standard constructions. Also gives information on use of valves in the outlet cone, types of accessories available. Builders-Providence, Inc.

MECHANICAL POWER TRANSMISSION

112 Speed Reducers—Catalog SCD-57, 8 pp, covers shaft-mounted Screw King speed reducers for screw conveyor application. By using data provided, selection of a complete drive can be made readily. Design details of the drive are discussed, and dimensional drawings included. The American Pulley Co.

113 Machined Parts—A complete line of gears, transmissions and other machined parts are described in this 26-pp catalog. How complete engineering and designing facilities, seven plants and over 2700 machine tools enable company to solve production problems for the automotive, aviation, appliance and many other industries is fully illustrated and described. New Process Gear Corp.

PUMPS, COMPRESSORS

114 Deep Well Pumps—Bulletin 4701-D describes an expanded line of Minuturb turbine pumps that deliver more than 100 gpm from deep wells. Presents construction features and performance data. These pumps are for service where more than the normal water supply is required. The Deming Co.

115 Sewage Pumps—Twelve-pp Bulletin 7500 illustrates heavy-duty wet and dry pit sewage pumps, small vertical sewage pumps and standard and submersible cellar drainers. Includes performance tables for selecting pumps, dimensional drawings and details of construction. Also lists control equipment. The Deming Co.

116 Air Compressors—This 20-pp catalog on air compressors covers ½- to 20-hp models for industrial and other uses. Well illustrated, gives complete specifications on single- and two-stage models, portable models, tanks, pumps and accessories. Charts, engineering data and information on compressed air are also included. Kellogg Div., American Brake Shoe Co.

117 Air Compressors—This consolidated data sheet lists ¼- through 20-hp, single and two stage air compressors. Complete specifications are tabulated. Brunner Mfg. Co.

ELECTRICAL

118 Secondary Substations—Twenty-pp Bulletin 9004-A describes and illustrates secondary unit substations designed for economy in installation and operation indoors or outdoors. Advantages of the equipment are detailed. Separate sections are devoted to incoming line section primary devices, transformer section, outgoing section secondary switchgear, and several systems are presented. Application tables and guide specifications for secondary unit substations given. I-T-E Circuit Breaker Co.

119 Servo Motors—Bulletin 385, 10 pp, gives characteristics, drawings, and application data on standard and custom servo motors. Data includes complete electrical and mechanical specifications, application data on direct plate to plate, transistorized servo amplifier, and similar applications. Norden-Ketay Corp.

120 Flat-Type Motors—Bulletin 3461 describes several models of flat-type motors for the machine tool and original equipment manufacturing industries. Both type DIE totally-enclosed non-ventilated flat-type motor and Type DIF totally-enclosed fan-cooled model are covered. Bulletin lists ratings of both motors and compares size and weight of the various flat-type models with standard motors of equivalent horsepower. Diehl Mfg. Co.

121 Cable Insulation—Bulletin 1106 is a 28-pp booklet explaining the four most-used methods employed in applying insulation to electrical conductors. Describes in easy-to-read language the advantages and disadvantages of each. Tips on cable selection are included. The Okonite Co.

122 Indoor Circuit Breakers—Bulletin GEA-6465, 16 pp, describes outstanding features of indoor oil circuit breakers. Contains pictures and drawings of four types of indoor oil circuit breakers; application information, and charts which list ratings, insulation levels, and interrupting capacities of the equipment. General Electric Co.

123 Oil-Tight Pushbuttons—Illustrated in full color, 30-pp Publication EL-178 presents company's line of oil tight pushbuttons, indicating lights, selector switches, Roto-Push buttons, covers and enclosures and accessories. All models are pictured along with selection charts, ordering information. Dimensional data included. Compactness, flexibility, durability and neat appearance of the pushbuttons are discussed. Cutler-Hammer, Inc.

124 Electrical Connectors—Eight-pp Bulletin 637 introduces the Pyle-Star line of compact, lightweight and environmental-resistant electrical connectors for industrial and other applications. Electrical capacities and other data are given for the new plugs and receptacles, claimed impervious to water, moisture, oil, gas, dust, pressure, and shock. The Pyle-National Co.

Reader Service Cards for ordering bulletins are on pages 247-248. Be sure to include your name, job title, and company, even if you want bulletins mailed to your home address.

125 Cord Sets—Catalog 3-57, 32 pp, covers company's complete line of cord sets, including the Powr-Kord heavy duty extensions, both 2-wire and 3-wire, 125-v and 250-v, for power tools, appliances and air conditioners. Trouble lights, floodlight holders and special-purpose extensions are also covered. A section describes UL and code standards, with charts for recommended wire sizes and current carrying capacities. Stock molds for caps, connectors, strain-reliefs and special connectors and attachments are also covered, with dimensional drawings, recommended cords. Royal Electric Corp.

126 Panel Wiring Techniques—Bulletin S-301, 8 pp, outlines methods for simplifying wiring operations for electrical and electronic equipment by use of raceways and pre-cut wires. It points out ways to improve appearance, describes, in pictures and text, procedure for installation, and how corners and T's are made. Specifications, part numbers and sizes are included. Stahlin Brothers, Inc.

LIGHTING

127 Fluorescent Lighting—Prepared for commercial and industrial users of fluorescent lamps, this 24-pp booklet features sections on general advantages of fluorescent lighting, development of fluorescence, and includes chapters on each of the lamp types, starters, lampholders, ballasts, and special lamps. Cites five major advantages of fluorescent lighting. Pictures, sketches and charts supplement the text. Sylvania Electric Products Inc.

128 Lighting Unit Specifications—The new 1957 edition of the "RLM Standard Specifications for Industrial Lighting Units" contains important revisions in specifications on both incandescent and fluorescent units, as well as new lighting data. Of special importance are new coefficient of utilization tables for eight units. Calculations are based on latest zonal

BULLETINS

(Begins on page 21)

method of computing coefficients of utilization and illumination on room surfaces. Also included are revised light distribution curves on RLM direct and semi-direct fluorescent units, popularly called "upward light." Candlepower distribution curves are plotted at normal, parallel and 45 deg. RLM Standards Institute.

MATERIALS HANDLING

129 Modern Handling Equipment—Two new catalogs are offered plant engineers concerned with efficient handling operations. Bulletin BU-305, 20-pp, describes design, engineering, construction and operating features of fork lift trucks, towing tractors and platform trucks. Photos and drawings help tell the story. Dimensions and specifications of each unit are included. Eight-pp Bulletin BU-387 covers a new line of clamping attachments. Photos of the clamps, side-shifting clamps, rotators and rotating clamps are provided. Materials Handling Div., Allis-Chalmers Mfg. Co.

130 Floor Truck Guide—Pocket-size Booklet 57-S, 32 pp, provides application and ordering information on company's line of floor trucks. Illustrates trailers, drag line trucks, dollies, jacks and skids, wagon trucks, barrel handling equipment, 27 different models of two-wheel trucks and four-wheel platform trucks plus a variety of casters and special duty trucks. Includes specifications on most popular items plus many "in use" pictures. Nutting Truck and Caster Co.

131 Portable Hoists—Twelve-pp Booklet 3-15 describes single drum multi-purpose portable hoists. Well illustrated, booklet carries specifications for a line of air, electric and gasoline driven models from 0.9 to 15 hp with lifting capacities from 750 to 5000 lb at speeds to 125 fpm. Joy Mfg. Co.

132 For Overhead Handling—Fourteen-pp pocket size Circular 163 presents a complete line of hand and electric hoists and related overhead materials handling equipment. Includes illustrations, descriptions and basic specifications of various models of company's Lodestar, Comet and Meteor electric hoists, the Cyclone and Blue Boy hand hoists, the CM puller and cranes and I-Beam trolleys. Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.

133 Four-Wheel Trucks—This series of ten product bulletins covers company's complete line of 4-wheel magnesium trucks. Detailed descriptions and specification data on platform trucks, trailer trucks, box trucks, and towveyor trucks, among other models in the line, are presented. Magline Inc.

134 Conveyorized Handling—Form IND-1 shows use of gravity and power belt conveyors in various industrial operations . . . in receiving, work in process, warehousing, packaging, other areas. Describes use of basic "packaged" conveyor units, portable lines and controlled flow systems. The Rapids-Standard Co., Inc.

135 Platen Conveyor—Bulletin C-1056 describes and illustrates Conveymatic Carrousel steel platen conveyors adaptable for materials handling, assembling, inspection or light machine operations. Gives construction details, sizes, travel speeds, working heights, load capacities and shows a typical light-machining set-up. Visi-trol Engineering Co.

136 Lightweight Lifters—Bulletin 5092, 8 pp, covers roller-chain and link chain Pul-Lifts, lightweight ratchet hoists of many uses. Design features are discussed and ordering data provided. Also included are replacement parts price list. The hoists come in capacities from ¾ to 15 tons. The Yale & Towne Mfg. Co.

137 Work Positioners—Multiple advantages of company's self-leveling work positioners in solving material positioning and handling problems in many industries are demonstrated in this 6-pp folder. Illustrations show how top layer of material on the platform is kept at right working level. Specifications of all types and models, including dimensions and capacities, are included. Lowerator Div., American Machine & Foundry Co.

138 Rotary Feeder—Six-pp Data Sheet DVc describes company's Type B rotary feeder for heavy duty materials handling applications. Construction features that permit regulated quantities, accurate feed and positive shutoff in handling dry, free-flowing granular and pulverized solids are detailed, and photos and cutaway drawings included. Tables for selection of sizes and capacities are also given. The Allen-Sherman-Hoff Co.

139 Freight Car Mover—Bulletin T-122, "How to Speed Up Freight Car Movement and Reduce Costs," 8 pp, tells of the use of the Trackmobile, a versatile freight car mover that travels on track or ground. Explains how this mover saves time and money because it is available at all times, provides more flexible car handling. Special features and other uses of the Trackmobile are discussed. Whiting Corp.

140 On Industrial Locomotives—Case histories of different types of industrial locomotives are contained in 24-pp Publication GEA-6332. Second in a series designed to aid plant engineers concerned with industrial haulage, this booklet gives operating conditions and performances of 14 switcher-type and other locomotives. General Electric Co.

WIRE ROPE

141 Wire Rope Slings—Provided in 52-pp Catalog A-931 is application and engineering information on wire rope slings and assemblies, including all-purpose slings, cable-laid slings, flatweave slings, fittings. Generously illustrated and arranged for easy selection, this booklet provides capacity data, dimensions for end fittings, ordering suggestions. A section of general information on slings is also included. John A. Roebling's Sons Corp.

142 Wire Rope—Volume 5, No. 1-7, of Rope Dope—company's series of educational bulletins on selection and specification of wire rope—contains further descriptive data on recommended practices. Among interesting features, is formula presented in Rope Dope No. 1 which enables users to predetermine the relative service life of different rope constructions. Union Wire Rope Corp.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

143 Air Tool Buyers Guide—This 84-pp second edition of company's Catalog 53 contains descriptions and specifications of a large line of industrial air tools. Some 40 basic tools, with thousands of model variations, accessories and adaptors, are described. Featured are new Uni-Tork screwdrivers and nutsetters, vertical grinders, die grinders, straight grinders. Catalog also stresses interchangeability of parts for many tools. Brief sections are devoted to contractor's air tools, high frequency electric and universal electric tools. Book is generously illustrated with photos, drawings. Thor Power Tool Co.

144 For Resistance Welding—Bulletin GEA-5945A, 8 pp, on all facets of company's control equipment, lists typical areas of applications, explains benefits of synchronous precision control for resistance welding, describes components and accessories of the control, and discusses use in spot welding, seam welding, combination welding, and bench welding. General Electric Co.

145 Shape-Cutting Machine—Eight-pp Catalog 804E describes advantages and applications of company's Monograph portable shape cutting machine. Features are fully described, and cutting range, weight, dimensions and other specifications given. Air Reduction Sales Co., Div. of Air Reduction Co., Inc.

146 Arc Welding Electrodes—Included in material presented in this 24-pp electrode data book are: information on AWS-ASTM arc welding electrode specifications; how to estimate electrode consumption; summary of welding symbols; factors in selecting electrodes and other data of interest to users of arc welding. A table of welding characteristics of mild steel electrodes is also included, as well as recommended current for welding various types of electrodes. National Cylinder Gas Co.

147 Machine Tools—Catalog M-1961, 72 pp, features complete information on company's machine tools, including milling machines, broaching machines, cutter and tool grinding machines, grinding machines, grinding wheels, cutting fluid, selective hardening machines, and special machine tools. Selector guides are included, as well as specifications on each item of equipment. Design and construction features are detailed, and photos, drawings and diagrams included. The Cincinnati Milling Machine Co.

148 Buying Used Tools?—"How to Buy a Used Machine Tool" is a primer on used machinery buying. Written in question and answer form this new booklet goes into such questions as what test equipment to bring along; detailed things to look for when inspecting a used tool; pros and cons of buying "as is"; reconditioned or rebuilt equipment; and guarantees available with purchase. S & S Machinery Co.

149 Turret Tool Posts—Eight-pp Bulletin 19-T describes company's turret tool post with clamping type handle designed to assure positive locking and withstand vibration. Application and dimensional information is given on several models and general discussion of design features is included. McCrosky Tool Corp.

150 On Abrasive Wheels—Book 6465 is a net price and data book, 36 pp, listing rubber and resinoid bonded grinding wheels. Actual consumer net price is shown for all quantities. Scheduled additions for special shapes are adjacent to straight wheel net prices. Separate pages cover special items, from which prices may be read directly. While not designed as a text or manual, this up-to-date book does provide a comprehensive picture of sizes, shapes, and types of grain available for industrial grinding wheels. Manhattan Rubber Div., Raybestos-Manhattan, Inc.

HEATING

151 Improved Space Heaters—Sixteen-pp Bulletin 564 introduces the Counterflo space heaters with induced draft Pyrojet burner designed to burn gas, light or heavy oil, or combination gas and light oil. Burner and other components are discussed. A large cutaway drawing shows construction and operating features. Specifications and dimensions are provided, also an explanation of how recirculation method distributes heat at working level. Dravo Corp.

On pages 247-248 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

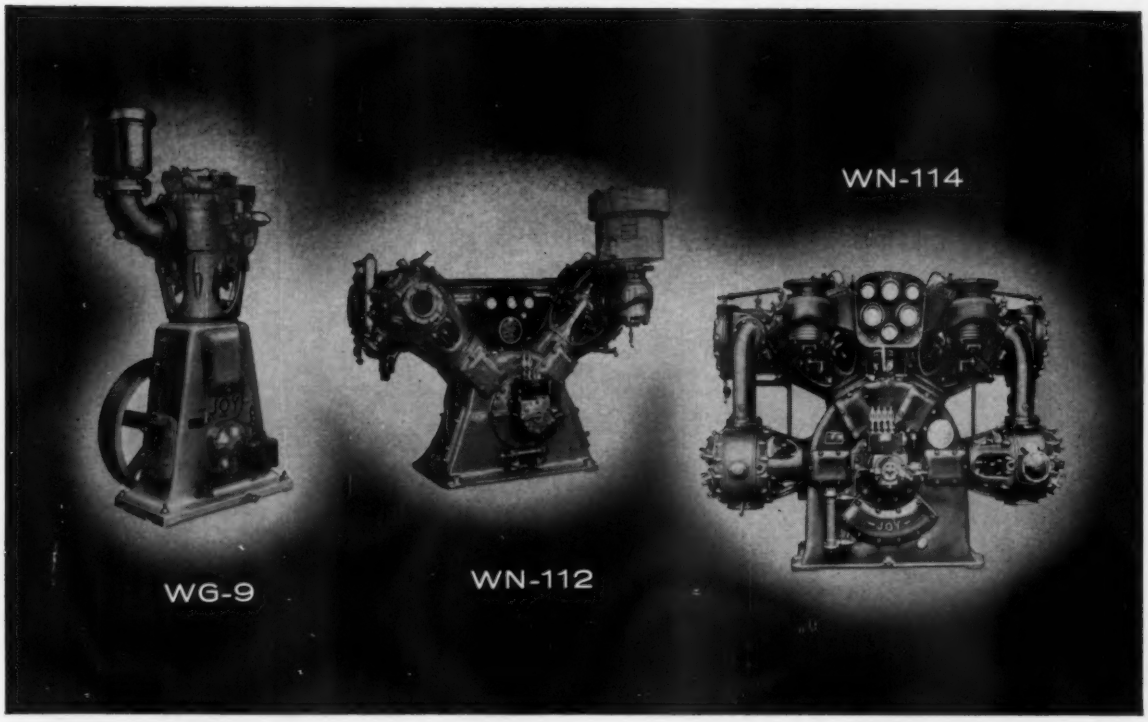
152 Electric Heaters and Devices—Bulletin GEC-1005H, 72 pp, features a power requirements section, showing short and long form calculations for heating applications. The 1957 catalog of company's heaters and heating devices, it includes information on such new products as redesigned cartridge heaters, miniature soldering irons, aluminized steel sheath strip heaters, and new ratings and configurations of finned tubular heaters. Also described are ceramic-to-metal and plastic resin hermetic seals. Includes data, specifications, operating information, and manufacturer's recommended list prices. General Electric Co.

HOSE AND FITTINGS

153 Fittings and Hose—Catalog 4431 describes re-usable Hoze-lok fittings used with cotton covered single wire braid hose for Freon 12 service. Photos and diagrams illustrate design and construction features, and complete size and specification data are included. The Parker Appliance Co.

154 Hose Clamps, Fittings—Twelve-pp Form 300RG presents company's standard type hose clamps, grooved hose fittings, and special tools and replacement parts. It also serves as an instruction and training manual. Separate sections are devoted to detailed coverage of such subjects as Punch-Lok method, uses and applications, how to apply clamps. Punch-Lok Co.

(More Bulletins on page 249)



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Single cylinder, single stage, double acting, water cooled. Joy vertical design saves space . . . fits right into plant expansion plans. Fourteen models. Bulletin shows cross-section diagram with construction and operation details.

JOY WN-112 • 60 to 150 Horsepower • 368 to 974 CFM

Two cylinder, two stage, double acting, water cooled. Joy pioneered the V-vertical design in 1936 . . . thousands of these units in operation. Nine models available. Bulletin gives complete details on construction and operation.

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Four cylinders, two stage, double acting, water cooled. Joy semi-radial design provides maximum capacity in very little space. Eight models. Bulletin gives complete construction details.

JOY MANUFACTURING COMPANY, OLIVER BLDG., PITTSBURGH, PA.

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FANS AND BLOWERS

ELECTRICAL CONNECTORS

OIL FREE COMPRESSORS

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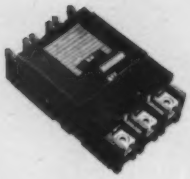
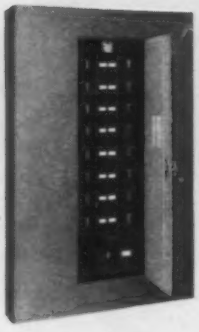
• Safety Switches and
Industrial Circuit Breakers

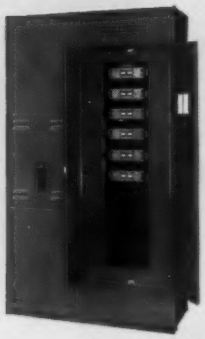


• Fusible and Circuit Breaker
Load Centers

• Voltage Testers



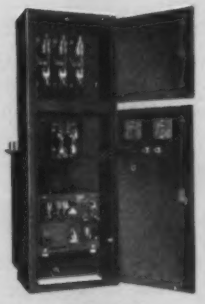
• Fusible and Circuit Breaker
Lighting and Power Panelboards



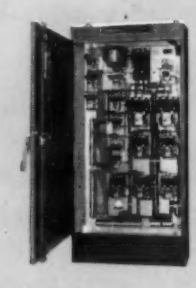
• Power Distribution Switchboards
and Switchgear

Wherever Electricity

• Busways and Wireways



EC&M
High Voltage and
Synchronous Starters

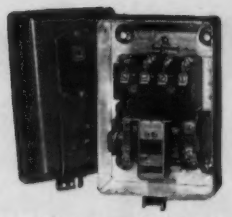


• Special Purpose
Control

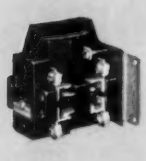
• Control Centers

SQUARE D COMPANY

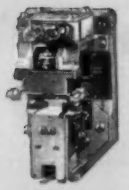
• A.C. Manual and Magnetic Starters



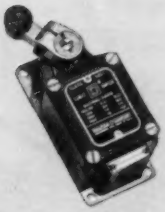
• Drum Switches



• Control Relays

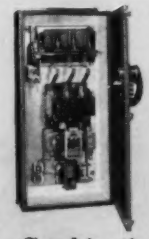


• Timing Relays

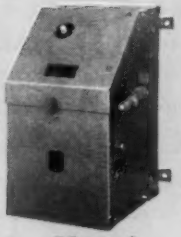


• Limit Switches

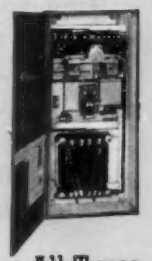
• Pushbuttons



• Combination Starters

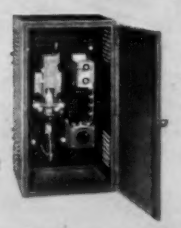


• Manual Compensators

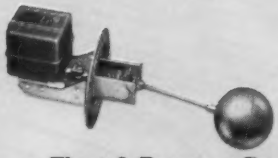


• All Types of Reduced Voltage Starters

• D.C. Starters

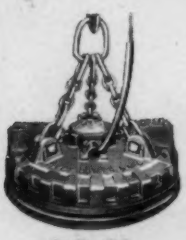


• Electronic and Electro-Magnetic Welder Control

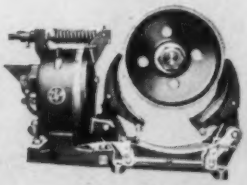


• Float & Pressure Controls for Pumps & Compressors

is Distributed and Controlled

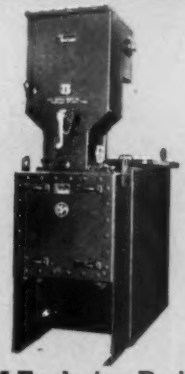


EC&M Lifting Magnets

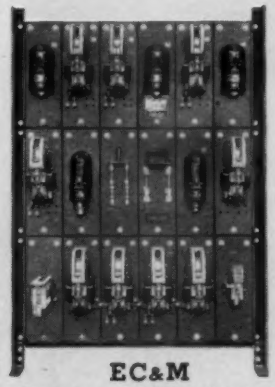


EC&M Magnetic Brakes

FIELD ENGINEERING SERVICE
available through Square D branch offices in all principal United States cities ... and in Canada, Mexico and England



EC&M Explosion-Resisting Control for Petroleum Industry

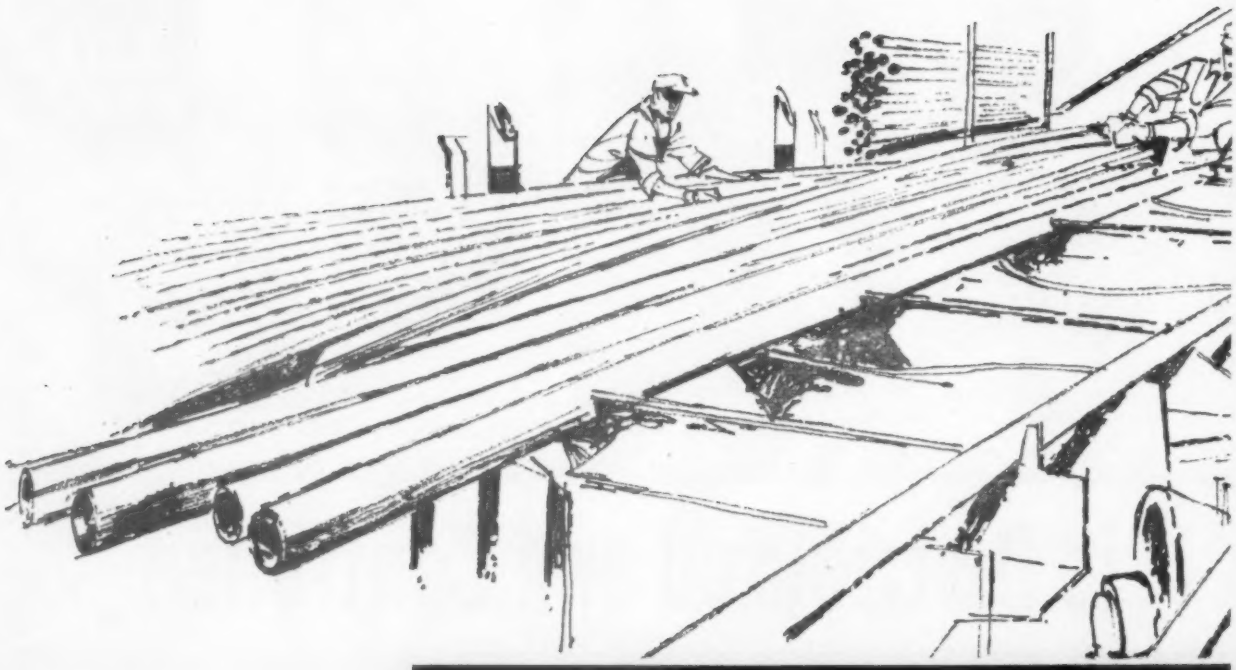


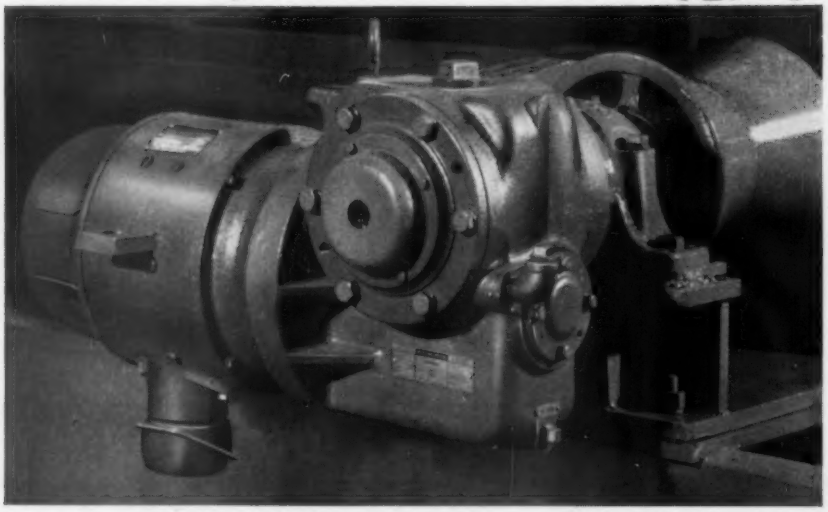
EC&M Crane and Mill Control

DESIGN LEADERSHIP FOR MORE THAN 50 YEARS

For more facts circle 515 on Reply Card

Seamless tube delivery gets **Triple protection in**





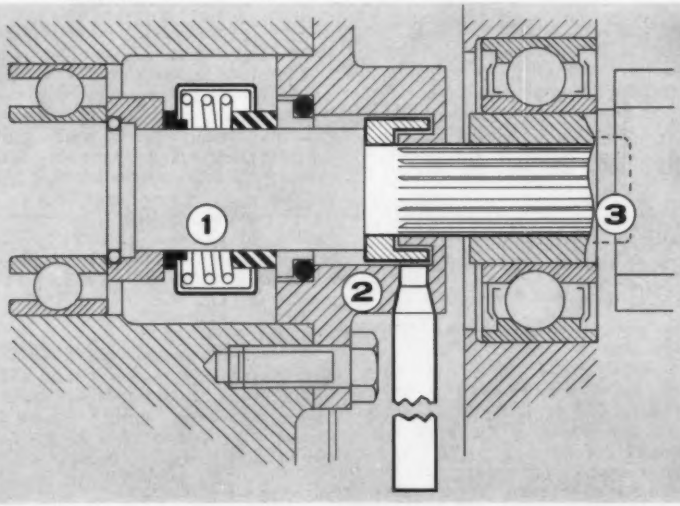
Westinghouse floating gearmotors

Westinghouse floating shaft gearmotors have undergone the critical tests of 24-hour-a-day, run-out table operations. Typical results come from a seamless tube drawing, tempering and annealing operation. Here, Westinghouse units bring three-way protection against the always-present problems of oil leakage and motor changes.

Two separate seal systems guard against oil leaking from the gear unit into the motor. An indicating feature warns of seal wear, before failure, in time for preventive maintenance.

Westinghouse splined shaft coupling permits easy separation of motor and gear assembly in seconds. Valuable inspection time is saved and motor changes can be made on the job, reducing down time.

Shock-absorbing spring mounting and rugged construction make Westinghouse floating-shaft gearmotors extremely tough . . . but why not see for yourself in Booklet B-6370. Call your local Westinghouse sales engineer for a copy, or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-07354



1. A combination labyrinth-packing and face-type seal on the pinion shaft prevents oil leakage from the gear housing into the motor.

2. For added protection an umbrella seal and drain catches any leakage through a worn shaft seal. Visual indication of seal wear is given by the drain.

3. The simple spline connection between motor and gear shafts permits fast demounting of the motor without disturbing gears or bearings.

YOU CAN BE SURE... IF IT'S Westinghouse

For more facts circle 516 on Reply Card

LUBRIPLATE No. 630-AA LUBRICATES ABOUT EVERYTHING

LUBRIPLATE No. 630-AA is practically a universal grease type lubricant. It was developed to meet industries' need for *"simplified lubrication"* . . . one lubricant to effectively satisfy a great number of requirements. LUBRIPLATE No. 630-AA has a smooth, stable consistency, a wide temperature range, possesses high film strength, fine adhesive properties and is water repellent. It satisfies most lubrication requirements, thus eliminates the need for a different lubricant for each application in many cases.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE

For nearest LUBRIPLATE distributor see Classified Telephone Directory. Write for free "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. LUBRIPLATE DIVISION, Fiske Brothers Refining Company, Newark 5, N. J. or Toledo 5, Ohio.

For more facts circle 517 on Reply Card

BACKTALK AND FORETHOUGHTS

Edited by Marjorie E. Weissman

Light and Color

PLANT ENGINEERING:

"We refer to the December, 1956 issue of PLANT ENGINEERING, pages 100-101, in which is included an article describing various light sources for color matching of production items.

"This article presents many valuable suggestions which we consider extremely helpful to the production and engineering personnel in our various plants. If possible, we would appreciate receiving four reprints of this article which we may circulate to the above personnel." *J. C. Schmitt, General Manufacturing Chemist, The Flintkote Co., East Rutherford, New Jersey.*

► For readers interested in "Light Sources for Color Matching," tear sheets of this article are available.—*Editors.*

More Information on S. A. Industry?

PLANT ENGINEERING:

"I read with great interest the article by Messrs. Krummell and McIntosh on 'Plant Engineering in South America' that you published in the November, 1956 issue. The authors have explored the field very thoroughly, but it seems that due to space limitations only part of the factual information gathered in their trips is reported in their article. I would like to know how I could have access to the rest of this data. Has it been published elsewhere? Do you plan any more articles on this subject?" *H. A. Brea, Overseas Engineering Div., Procter & Gamble Co., Ivorydale, Cincinnati, Ohio.*

► Mr. Brea was correct in thinking that there might be some additional material and we are sending him those parts of the authors' original manuscript that were not used in our article.—*Editors.*

Keeping Tool Supplies Intact

PLANT ENGINEERING:

"We have a rather acute problem in the handling and requisition of ordinary hand tools such as light wrenches and screw drivers. Our annual loss measures upwards of $1000.

"Our problem is further amplified by the fact that we are operating continuously for 24 hours a day, seven days a week, including holidays. This necessitates the use of the supply house where all tools are located during prime non-supervisory hours.

"We employ approximately 25 men who must have frequent access to these tools. It would not be economical to hire a store keeper on a full time basis as this would require an annual payroll many times more than our measure of loss.

"We are writing to you in the hope that you may have published articles which might explain ways and means to prevent the loss of simple hand tools. Any information which you can supply to us along this line will be greatly appreciated." *Frank J. DeAngelis, General Manager, American Lignite Products Co., Ione, Calif.*

► The problem of handling and requisitioning hand tools without loss is one that has faced, in particular, a number of the smaller metal working and maintenance operation groups, but it has been solved by most of them. The employer has, in each case, purchased a complete set of tools of the very best quality for each mechanic, electrician, etc., who would normally use them. In all cases, whenever a tool is lost or broken, the employee must purchase a replacement at his own expense.

Some of these companies do maintain a small stock of tools which is kept under lock and key at all times, with the foreman or some supervisory personnel responsible. Thus, if a critical tool is lost, during the hours when it is needed, there is always one available to supply the mechanic, who is charged with the cost.—*Editors.*

Still a Favorite

PLANT ENGINEERING:

"We find your magazine very interesting and helpful and certain sections such as Construction Briefs, we tear out and maintain in a separate file.

"This particular section is of help to our plant engineering department, especially to some of the men who do not use this type of information continually and become rusty on it.

"However, in checking through our file of the tear sheets of Construction Briefs, we find a number of omissions, apparently because the particular pages were removed and not returned. I am listing below the months we have with the thought that you might be able to supply tear-outs of some of the missing months, to whatever extent your files permitted." *W. E. Johnson, Assist. to Executive Vice President, Phoenix Manufacturing Co., Joliet, Ill.*

PLANT ENGINEERING:

"We would appreciate receiving a complete set of Construction Briefs which we understand has been published in three booklets at 50 cents apiece." *George M. Avalon, Vice President in Charge, Manufacturing, Permo, Inc., Chicago, Ill.*

PLANT ENGINEERING:

"For enclosed money order of $1.50 please send me the set of three Construction Brief booklets as mentioned in your issue of December 1956.

"My crew and I consider your publication of one of our favorites and derive

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REGISTERED PROFESSIONAL CHEMICAL ENGINEERS

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Chemical Engineers

CONSULTANTS ON ALL WATER PROBLEMS

GENERAL OFFICES AND LABORATORIES
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NEW PLANT FLEXIBILITY

gives these PROVABLE SAVINGS

- moves *Inland Steel Products* into special production 4-times faster
- helps cut direct-labor costs 20% for *The Colorado Fuel & Iron Corp.*
- no lost production time in moving *Wyman-Gordon* machine shop
- cuts machine installation cost 90% for *American Type Founders*

Barry Leveling Machinery Mounts let you move machines wherever they are needed, and have them delivering full output *in minutes*—with no delays for drilling, lagging, or shimming.

"PROOF-OF-PERFORMANCE" REPORTS FREE!

These reports, giving details of results obtained from Barry Mounts in large and small plants, point the way to important savings in your plant. WRITE NOW FOR YOUR COPIES.

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BACKTALK— FORETHOUGHTS

much benefit from reading it. It reaches us at Newark City Hall where it is sent to us. Our best wishes for its continued publication." *Louis Etzel, Chief Engineer, Newark, N. J.*

► In case some of our readers missed the recent announcement of the availability once again of the complete set of Construction Briefs, here is the information. All articles in this series, published between July 1953 and August 1956, have been reprinted in three booklets, priced at 50 cents each. Each booklet covers one of three periods: July 1953 to May, 1954; July 1954 to May, 1955; and August 1955 to August 1956. Booklets may be purchased separately or as a complete set.—*Editors.*

Engineered Maintenance

PLANT ENGINEERING:

"Please send us a tear sheet of the article entitled 'Engineered Maintenance Is Better, 10 Ways,' appearing in the January, 1957 issue of PLANT ENGINEERING. Thank you." *C. I. Fellers, Asst. Supt. Plant Engineering & Maintenance, Navy Ordnance Div., Eastman Kodak Co., Rochester, N. Y.*

PLANT ENGINEERING:

"Will you kindly send us six copies of the article 'Engineered Maintenance Is Better, 10 Ways,' by George E. Wralstad, of the General Electric Co., Fort Wayne, Ind., as shown in your January, 1957 issue on page 94." *T. F. Britton, Jr., Staff Asst., Anchor Hocking Glass Corp., Container Div., Salem, N. J.*

► Tear sheets of this article are still available to other readers who are interested in obtaining them.—*Editors.*

Organizing PM Programs

PLANT ENGINEERING:

"Our company has never had a formal preventive maintenance program and we have done our maintenance as the need developed. It is now our desire to institute such a formal program and we are wondering if you have any available information or editorial material, which you might have previously published, which would aid us in setting up this program. Any information which you do have and can send us will be very helpful and I assure you it will be very much appreciated." *R. E. Glos, Jr., Stover Steel Tank & Mfg. Co., Freeport, Ill.*

PLANT ENGINEERING:

"I am in the process of starting a preventive maintenance program in this plant. I have from time to time noticed articles on preventive maintenance and work procedures in your magazine and would appreciate your sending me any articles on this subject that might be available.

"I would also like to request a reprint of an article published in PLANT ENGINEERING magazine, January, 1957 issue, titled 'Designing for Corrosion Resistance.'" *M. A. Schulman, Assist. Plant Engineer, Revlon, Metuchen, N. J.*

► "Industrial Maintenance," a booklet containing 12 articles on this subject, reprinted from PLANT ENGINEERING, has been sent to each of these readers. "Designing for Corrosion Resistance" is a two-part article, published in our January and February, 1957 issues, respectively. Tear sheets of the complete article are now available. —*Editors.*

Building Tube Tester.

PLANT ENGINEERING:

"Approximately two years ago, there was an article in your magazine about a Thyratron tube tester which had been built by the maintenance department at the Ryan Aeronautical Corp. A few months later, you printed a second article giving wiring diagrams, components, etc., required to make this tester.

"We are very interested in having a tester of this type and are planning on buying or building one. If at all possible, we would like to have reprints of these two articles and would appreciate it if you can send them to us.

"We enjoy your magazine very much here at Frost. It is well read by the men in our Maintenance Departments as well as by myself." *G. W. Callbeck, Assist. Supt. Engineering, Frost Steel and Wire Co., Ltd., Hamilton, Canada.*

► The first article on the Thyratron tube tester appeared in our November, 1954 issue. In January, 1955 we published details of its construction.—*Editors.*

Cabinets Galore

PLANT ENGINEERING:

"On page 105 of the February, 1957 issue of PLANT ENGINEERING, there is described a method of constructing cabinets for instrumentation, automation and electronic equipment, which you designate 'erector set' cabinets.

"Could you let us have the name of the manufacturer of this equipment, so that we could in turn, get in touch with this company to secure prices from them?" *A. J. Otto, Vice President-Works Manager, Johnson Service Co., Milwaukee, Wis.*

PLANT ENGINEERING:

"The article, 'Erector Set Cabinets,' describes some preassembled building block components that are useful in making cabinets. Will you please advise who manufactures this equipment." *John E. Duesing, Sales Manager, Mechanical Div., Hagan Chemicals & Controls, Inc., Pittsburgh, Pa.*

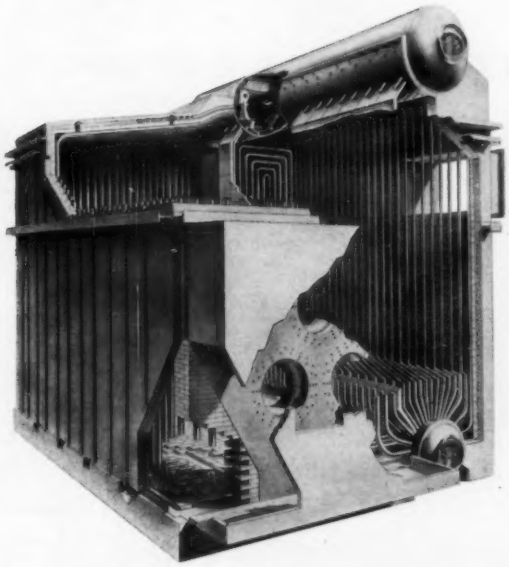
► An almost infinite variety of cabinets can be made from the 75 "building block" metal enclosures and 125 sub-parts mentioned in our February story. Readers seeking more information about them should write to Mr. S. F. Frankel, President, Elgin Metalformers Corp., 630 Congdon Ave., Elgin, Ill.—*Editors.*

Here's why you get

IMPORTANT SAVINGS in

- ✔ *first cost*
- ✔ *installation*
- ✔ *operation*
- ✔ *maintenance*

with the FW Series "SC" STANDARD BOILER

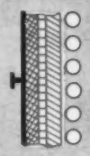


THESE nine Foster Wheeler design features add up to substantial savings in the cost of steam generation. Equally important is the extra *dependability* that's built into every "SC" unit – the result of over 60 years of experience in the design and construction of large, high-pressure steam generators for leading central station power plants.

Pre-engineered in all details and standardized for economy, these FW standard steam generators are available for oil or gas firing, in capacities from 50,000 to 150,000 lb/hr, for pressures to 1500 psi and superheated steam temperatures to 950 F. For complete information, send for Bulletin B-55-4. *Foster Wheeler Corporation, 165 Broadway, New York 6, N.Y.*

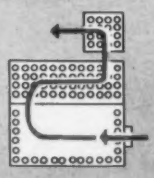
1. COMPLETELY WATER-COOLED WALLS

All furnace walls are cooled by closely-spaced tubes, minimizing setting maintenance and preventing excessive exit gas temperatures.



2. EFFICIENT FIRING ARRANGEMENT

Burner arrangement assures maximum rating without overheating furnace tubes. Rear wall is over 19 ft. from burner wall, permitting long, horizontal flame travel.



3. FULLY DRAINABLE SUPERHEATER

A completely drainable superheater permits removal of all condensed water from the elements before start-up.

4. HIGH STEAM PURITY

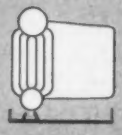
The normal drum internals consist of chevron dryers and a dry box. Separators may be added which make possible a steam purity of 1PPM or less.

5. UNRESTRICTED CIRCULATION

Absence of headers provides free circulation through integral risers and downcomers, eliminating header handhole plates and gaskets.

6. BOTTOM SUPPORTED UNIT

The bottom-supported design fully utilizes the structural strength of the tubes and provides low unit stresses in all members.

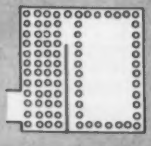


7. PRESSURE-TIGHT CASING

The all-welded casing forms a rigid, pressure-tight unit that can be arranged for pressurized or balanced draft operation.

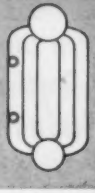
8. MINIMUM REFRACTORY BAFFLING

The wall separating furnace and boiler bank is the only refractory baffling used. It is completely accessible from the furnace.



9. SIMPLE SOOT BLOWER ARRANGEMENT

Soot blowers are supported on the outer row of boiler-bank tubes, simplifying alignment and providing easy access.



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LYON quality design is reflected in this new handle with beautifully contoured lines, finger-tip action and finished in durable chrome.

"LYON QUALITY DESIGN *makes* THE DIFFERENCE!"

STEEL LOCKERS, for example. Look for the design features that pay off for years and years. Compare Lyon construction and you'll see how and why you get so much more in both durability and appearance.

This same quality design makes the difference in every one of the more than 1500 standard Lyon items, a few of which are shown below.

CALL YOUR LYON DEALER. He offers the world's most diversified line of steel equipment. Equally important, he can show you how to get the most for your money in terms of saved time and space.

We can manufacture special items to your specifications.

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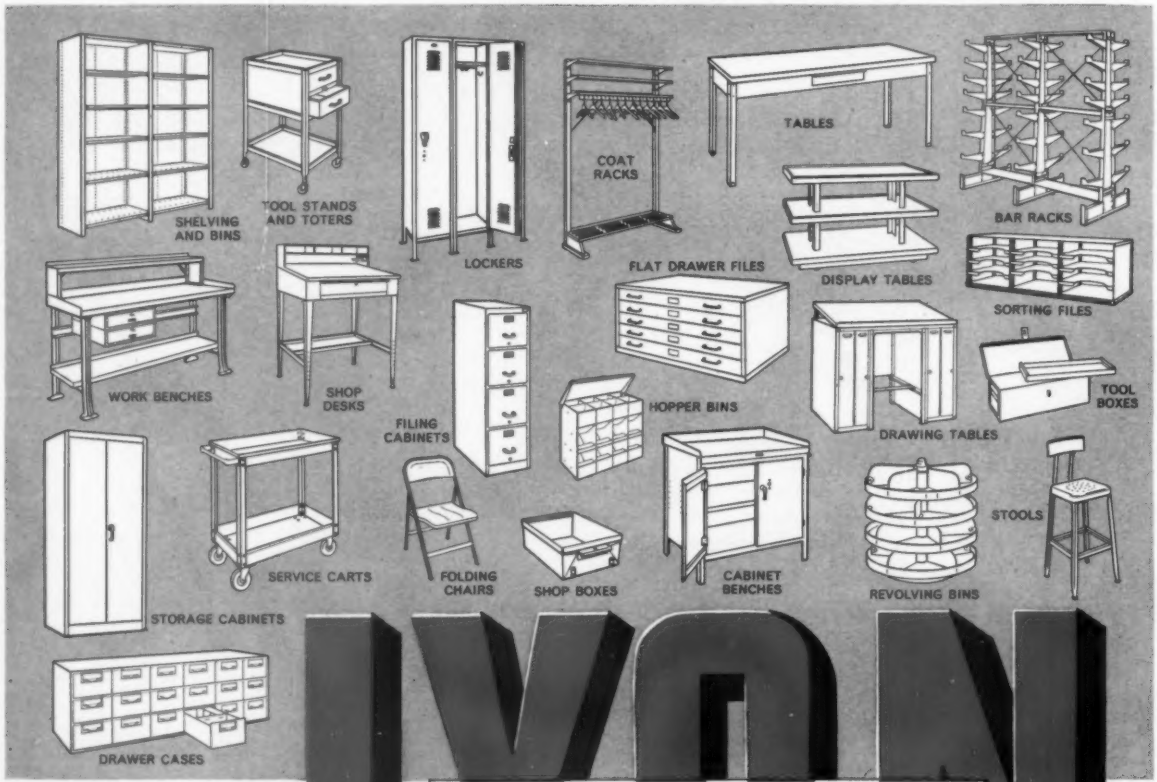

OVER 1500 ITEMS
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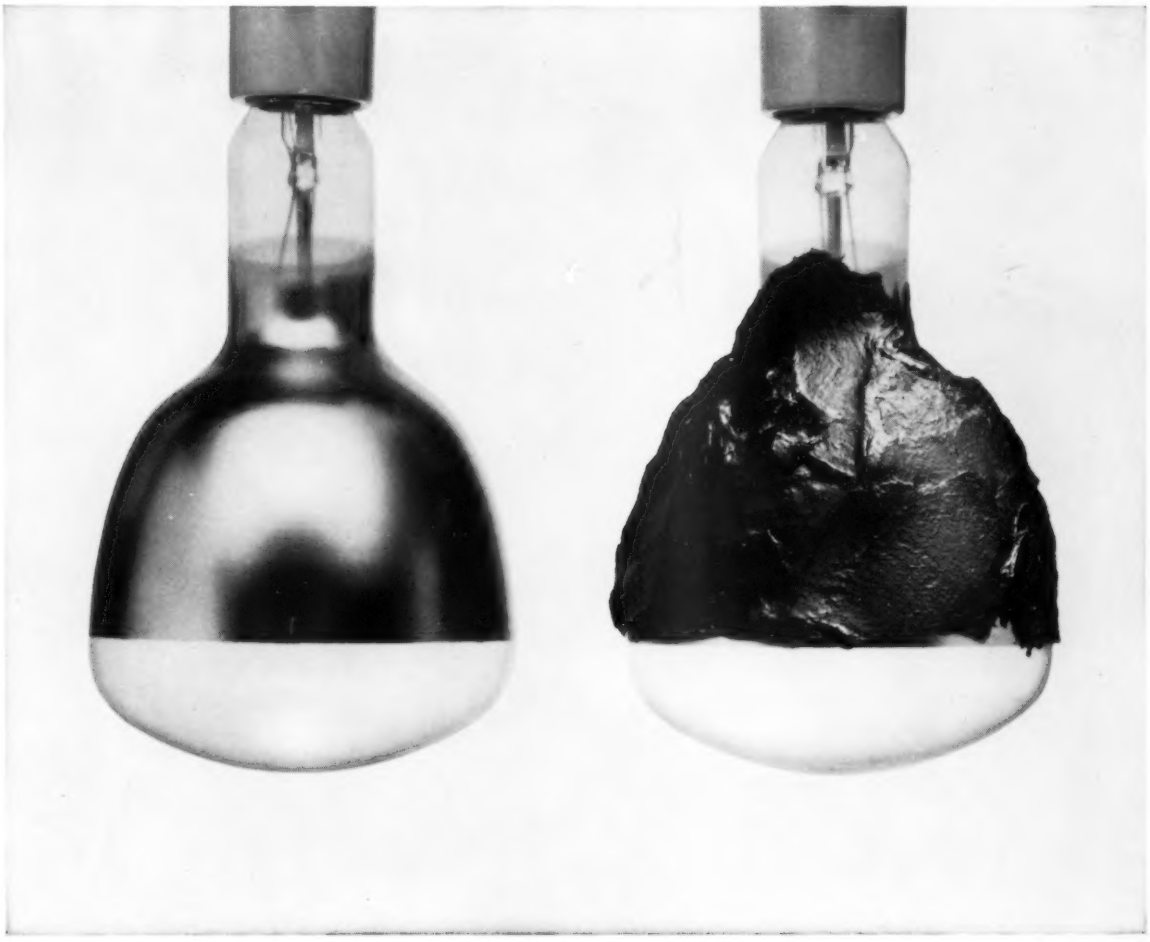
STEEL EQUIPMENT

For more facts circle 521 on Reply Card

G-E LAMPS GIVE YOU MORE FOR ALL YOUR LIGHTING DOLLARS



Which General Electric Reflector lamp gives the most light—*and why?*

A THICK coating of tar was smeared on the surface of the right hand lamp where dirt normally collects in use. But in this type of G-E Lamp, it makes no difference. *Both lamps still deliver the same amount of light!*

Why? The important facts are: Dirt just can't get *inside* to the pure silver reflector, sealed in the bulb. Hardly any dirt collects *outside* on the bulb bottom where all the light comes from. That's why light output is practically unaffected by dust and dirt. And since they seldom if ever need cleaning, maintenance costs take a sharp drop.

General Electric *Filament* Reflector Lamps are available in 500-watt, 750-watt and 1000-watt sizes with pure silver reflectors. G-E *Mercury* Reflector Lamps are available in 400-watt (silver or phosphor reflectors), and 1000-watt (phosphor reflector) sizes.

SWITCH TO G-E REFLECTOR LAMPS (Filament or Mercury) YOU'LL GET MORE LIGHT, SAVE ON MAINTENANCE, TOO!

Your General Electric Lamp Representative will be glad to help you pick the best one for your plant. Call him today—or write: General Electric Large Lamp Dept. PE-4, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 522 on Reply Card

For more facts circle 523 on Reply Card →

NEW...
TYPE
CLF
FUSE
CAT. NO. GF7C4000
4000 AMPS.
600 V
INTERRUPTING RATING
200,000 RMS SYMMETRICAL AMPS.
LOW VOLTAGE SWITCHGEAR DEPT.
GENERAL ELECTRIC
PHILADELPHIA, PENNA
CAT. NO. GF7C4000
TYPE
CLF
FUSE
6 AMPS.

. . from General Electric a complete line of Current Limiting Fuses

RATINGS FROM 6 TO 4000 AMPERES
INTERRUPTS 200,000 AMPS SYMMETRICAL

With a laboratory proven interrupting rating of 200,000 rms symmetrical amperes, General Electric's new line of Current Limiting Fuses now offer you better protection on circuits from 6 to 4000 amperes.

Your General Electric Apparatus Distributor will soon be able to offer you the advantages of local warehousing, fast delivery, and can now give you personal assistance in selecting the fuse to fit your needs.

	250 volts A-C or D-C	250 volts 60 cycle A-C	600 volts A-C or D-C	600 volts 60 cycle A-C	480 volts 60 cycle A-C
CURRENT RATING (Amperes)	6 15 20 30 40 60 80 100 150 200	300 400 500 600	6 15 20 30 40 60 80 100 150 200	300 400 500 600 800 1000 1200	1600 2000 2500 3000 4000

Progress Is Our Most Important Product

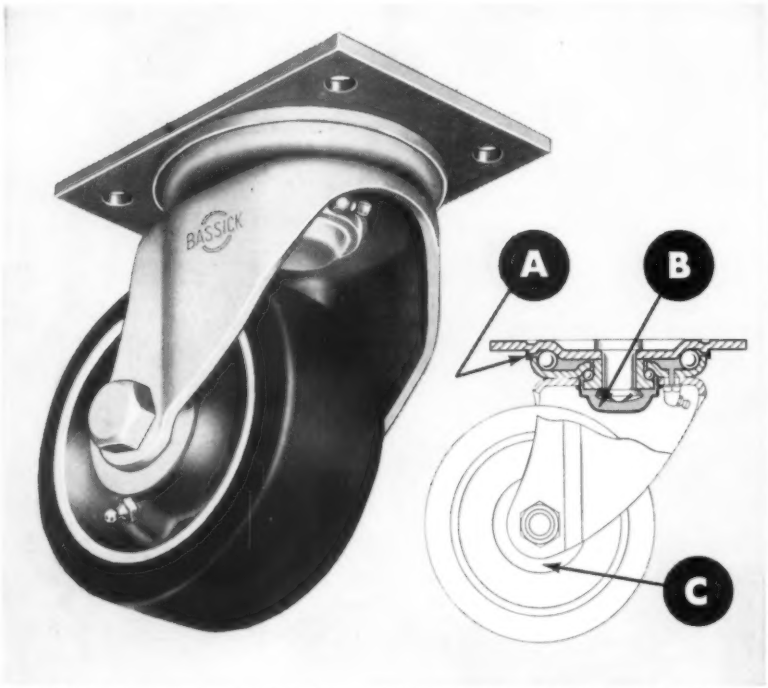
GENERAL ELECTRIC

Although the 4000-amp giant of General Electric's CLF fuse line dwarfs its 6-amp "little brother," all ratings have the same laboratory tested current limiting characteristics. Ask your G-E distributor or General Electric sales engineer about them soon.

For complete descriptive information (GEA-6319B) on Type CLF fuses, write Section 528-1, General Electric Company, 1 River Road, Schenectady 5, N. Y., or ask your G-E distributor or General Electric representative for a copy of the CLF fuse bulletin.

MATERIALS-HANDLING NEWS

★ NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS ★



A. Baffle ring keeps dirt, water out. B. Grease retainer prevents loss of lubricant. C. Wheel bearing seal keeps grease in, foreign matter out.

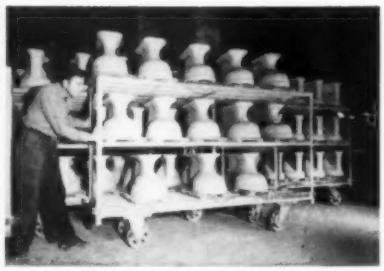
Sealed casters stay lubricated —reduce maintenance costs

Heavy duty, all purpose Bassick S99 casters shoulder loads up to 1500 pounds apiece and stand up to the abuse of power pulled trucks or assembly line dollies.

Sealed wheel and swivel bearings (see drawing) put lubrication on a once-a-year basis, assure extremely long caster life, eliminate floor hazards due to dripping grease, provide a free rolling wheel with a minimum of frictional drag.

Other extra quality design features include heavy gauge (¼" thick) formed steel construction for long life, oversized swivel bearing area for greater stability, and optional plunger type swivel lock (below). These new Bassick S99 casters come in 5, 6, 8 and 10" wheel sizes; in swivel or rigid construction; with forged steel, semi-steel, phenolic resin, and rubber tired industrial wheels.

S99 caster with swivel lock.



Easy does it at
AMERICAN-Standard

Since the New Orleans plant of the American Radiator & Standard Sanitary Corporation was opened in 1949, Bassick "Floating-Hub" casters have been the only caster used here. What makes the job tough is that the vitreous china fixtures are so heavy. Rubber tired casters would be too hard to push. But Bassick steel wheel "Floating-Hubs" are sufficiently jar-proof, stable and shock absorbing to protect the fragile material and yet allow one man to move the heavy loads with ease.

For more facts circle 524 on Reply Card

Lunch comes on casters as Douglas Aircraft cuts costs

Usually the workers go to the cafeteria for lunch, but at the Torrance facility of Douglas Aircraft's El Segundo Division, the cafeteria comes to the workers. Twelve food trains on Bassick casters convey food to appointed areas near modern dining rooms where workers serve themselves from electrically refrigerated or heated carts. This system serves 8000 people on two shifts and can be expanded to serve twice this number. Man hours lost by employees in going to and from cafeterias and standing in long lines is cut immeasurably. Would mobile cafeterias on Bassick casters make your plant's lunch period more efficient?

Check your Bassick Distributor

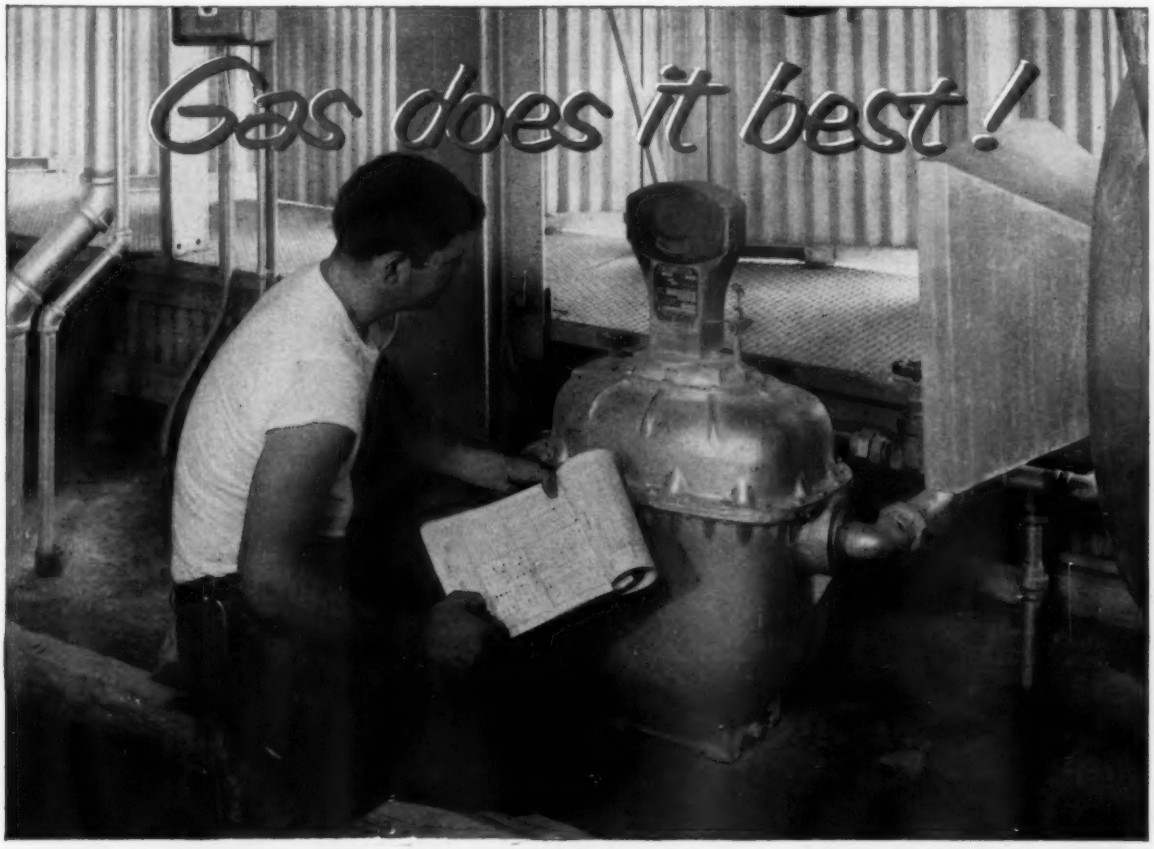
He performs a valuable service by carrying in stock most widely used caster types and sizes. He keeps a steady supply flowing from his warehouse to your plant. 7.39

see our catalog in Sweet's or write for copy

THE BASSICK COMPANY
Bridgeport 2, Conn.
In Canada: Belleville, Ont.

Bassick
A DIVISION OF STEWART WARNER

MAKING MORE KINDS OF CASTERS... MAKING CASTERS DO MORE



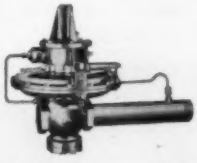
METER YOUR INDIVIDUAL FURNACES TO CONTROL QUALITY AND COSTS

When you process with gas, metered records of consumption will quickly show up combustion deficiencies that affect the quality of your end product. Meters standing guard at every burner will discourage wasteful fuel practices. And only from metered records of the fuel used can you arrive at accurate costs.

Why don't you investigate the advantages of metering individual furnaces, kilns or ovens? Learn the economies of using Rockwell meters as production tools. *Write us or use the handy coupon.*

Good Combustion Requires Close Regulation

For Low Pressure Burners



For High Pressure Burners

Good combustion control is the key to good process control. Rockwell makes a complete line of pressure regulators for all types of industrial burners. Use the coupon for full details.

ROCKWELL
GAS METERS and REGULATORS

CLIP COUPON—MAIL TODAY

Rockwell Manufacturing Company
Pittsburgh 8, Pa.

Gentlemen:
I am interested in your meters for measuring gas to individual furnaces ☐. Your pressure regulators for burner control ☐. Please send literature ☐. Have representative call ☐.

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For more facts circle 525 on Reply Card

PLANT ENGINEERS' DIGEST so those who rush may read and know what's new

Edited by Marjorie E. Weissman

Garage Goes Up Around Elevator

SINCE THE CONCRETE, unfinished-wall type construction used in building an automobile parking garage in Miami, Fla. would be ready for use shortly after the concrete was dry, it was possible to build the elevator hoistway first, then construct the rest of the building around it. This resulted in having the two, 2000-lb capacity elevators working two weeks before the garage was open to the public instead of three months afterwards.

First, concrete slabs that would form the four walls of each floor of the elevator hoistway were poured on the ground, then each slab was lifted into place by a crane. Welders then joined the angle irons that had been cast into the slabs. Four days were required to place and weld the 28 slabs needed to complete all six floors of the hoistway.

Finally, the machine room was constructed by installing a prefabricated floor and concrete block walls. A concrete slab roof completed the room.

A steel ladder molded into the rear wall of the hoistway will be used later for special construction and maintenance work. *From Otis Bulletin, published by Otis Elevator Company, New York, N. Y.*

Reactor Inspection by TV

TICKLISH TASK of patrolling the rear face of an atomic reactor at the Hanford atomic plant at Richmond, Wash., is to be done by a remotely operated television camera. Designed to move automatically along a monorail near the wall of the reactor, the camera will transmit a picture of reactor components to an operator seated behind radiation shielding.

Use of the camera is expected to speed maintenance jobs by making it possible to pinpoint trouble spots before special work crews are sent into the area.

As the camera moves along the monorail, it will "examine" pipes for leaks and observe fuel elements as they are removed during discharge operations. It will afford closer supervision of work details and will eliminate the present use of mirrors to see around the protective labyrinth which shields against radiation.

The camera is installed in a protective metal box with safety glass in front of the lens, which is focused remotely from the control point. If moisture collects on the window, an automotive-type window wiper cleans it. A floodlight on each side of the camera box provides illumination.

Equipped with a pan and tilt mechanism, the camera can be turned or tilted by remote control. By combin-

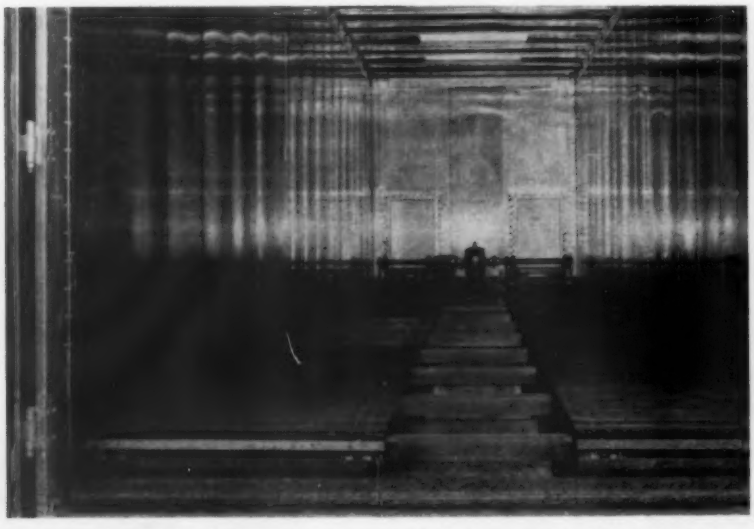
(Continued on page 40)

Reversible Slat Conveyor Loads and Unloads Cans in Trailer Truck

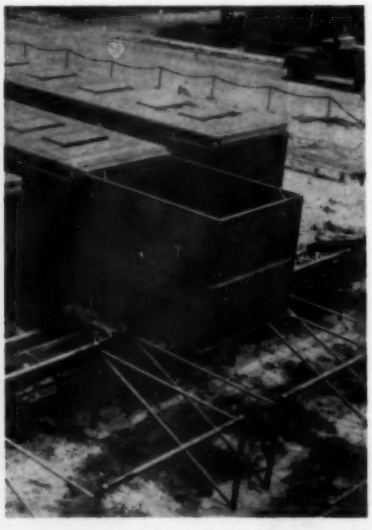
NEW TRANSPORTATION technique, consisting of loading jumbled cans into a removable and reusable compartment or box liner, that fits inside a trailer truck, is being used by the American Can Co. in Plymouth, Florida to ship 6 oz. size cans. The system eliminates the conventional method of shipping cans positioned manually in orderly rows and the attendant dunnage in form of liners, fillers and bracing.

Cans are "poured" or jumble loaded into the compartmentalized liner which is then retracted on a conveyor for shipment. To unload the cans, the liner is rolled out and, as it clears the tailgate, a trap door on the under side of each compartment swings open, discharging cans into a cross belt conveyor which carries them to the production line.

This method of transportation is made possible by the use of a small reversible conveyor secured to the trailer bed. The conveyor consists of two slat conveyors which travel at the rate of 12.8 fpm. It is powered by an electric motor which can be connected to power outlets at shipping and receiving docks. Easily removed when the trailer is required for other forms of transportation, the conveyor stands approximately eight inches above the floor. *From a release of Link-Belt Co., Chicago, Ill.*

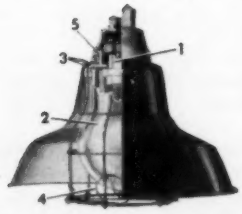


Interior of trailer truck showing slat conveyor which moves truck liner in and out



Cans are unloaded on to cross conveyor

New CROUSE-HINDS
VAPORMASTER® Lighting Fixtures



1 *Shock-absorbing receptacle* – takes jolts from any direction. 2 *Pear-shaped globe* – plenty of clearence for lamp. 3 *Vapor-tight seals throughout* – fully gasketed construction. 4 *Globe clamping spring* – flips open for re-lamping – no tools needed. 5 *Aluminum adapter-guard* – 2 sizes fit *all* Condulet bodies.

Here is vapor-tight, shockproof industrial lighting engineered for the greatest possible economy and convenience in both installation and maintenance.

In any indoor or outdoor exposure to moisture, rain, gases, dirt, or corrosive vapors . . . a new standard of operational efficiency is set by the new VaporMaster series. Cleaning and re-lamping is done in half the time, *without tools*. Whenever a demand for a change in lighting intensity develops, a simple change of adapters accommodates the larger lamp – without touching the wiring!

Hundreds of fixture combinations may be assembled from 33 standard components to meet your varying needs. Typical choices:

- *Condulet® bodies* in pendent, ceiling or bracket types and with side hubs.
- Adapters in two forms . . . one for lamps up to 150-watts A23 . . . one for 200- and 300-watts PS30 medium base lamps. Sizes may be changed without disturbing wiring merely by installing adapter for the desired lamp.

ASK FOR CATALOG INFORMATION ON THE VAPORMASTER SERIES TODAY

Just call your Crouse-Hinds distributor . . . or nearest Crouse-Hinds office.

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FLOODLIGHTS • CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING

For more facts circle 526 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

ing the features of a vertically movable monorail with the pan and tilt apparatus, engineers have provided a means of camera coverage of the entire face of the reactor.

The picture is transmitted through a closed circuit to the control room monitor and to a 21-in. viewer near the front face of the reactor to inform workers of the progress at the rear of the reactor. *From a release of General Electric Co., Schenectady, N. Y.*

Longer Wear From Stainless

CERTAIN CONDITIONS occurring during operation may affect the corrosion resistance of stainless steel equipment. Some of these conditions can be eliminated or relieved by following these suggestions wherever possible.

1. Avoid a concentration of corrosive elements, especially the halogen ions. Watch for stages in the process where accidental variations may occur in concentrations. Gravity, evaporation, condensation, temperature, or other forces may be the cause. Agitation of solutions helps to cure this.

2. Insure uniform oxygen or oxidizing solutions. These maintain uniform passivity. Agitate solutions and avoid pockets of stagnant liquid.

3. Keep oxygen level high or eliminate it entirely. A high level of uniform oxygen concentration promotes passivity; on the other hand, complete elimination of oxygen reduces pitting in salt solutions.

4. In general, operate at the lowest temperature possible, since pitting increases with higher temperatures. If the equipment is allowed to accidentally overheat, immediate damage may result. Since stainless has low conductivity, warping can occur. If the equipment is held in the sensitizing range, intergranular corrosion is possible. Abuses such as these can be avoided by the addition of warning devices and knowledge of the equipment.

5. Increase pH factor if possible. Pitting is substantially reduced when alkalinity of solution is increased.

6. Add passivators or inhibitors to the solution. Most of the relatively few substances that will corrode stainless steel can be inhibited.

7. Where fluid is moving, allow some air to enter the system to relieve local low-pressure, the cause of cavitation, whenever practicable.

8. Build-up or deposits of material should be avoided by frequent and regular cleaning. *From a release of the American Iron and Steel Institute, New York, N. Y.*

Decentralized Hot Water Supply

BY DECENTRALIZING the supply of hot water to washrooms and the plant cafeteria and using individual water heating units close to the point of use, long pipe runs for hot water have been avoided at the Syracuse plant of Electric Auto-Lite Co. In addition, the units have been installed above the floor, leaving the areas clear for truck and other traffic.

Hot water heaters are installed above floor level and close to point of use

For purposes of planning the hot water supply, the plant was considered as divided into four separate areas.

In the first area, three automatic storage gas water heaters were installed to provide hot water for men's and women's wash rooms. The water heaters are piped into a common mani-

(Continued on page 42)

Electronic Air Cleaning Means Less Building Cleaning and Lower Cleaning Costs

IN A STUDY of 624 office buildings, it was found that owners spend on the average 57 cents per sq ft to keep office space clean enough for occupancy. This represents 23 per cent of a building's entire operating cost.

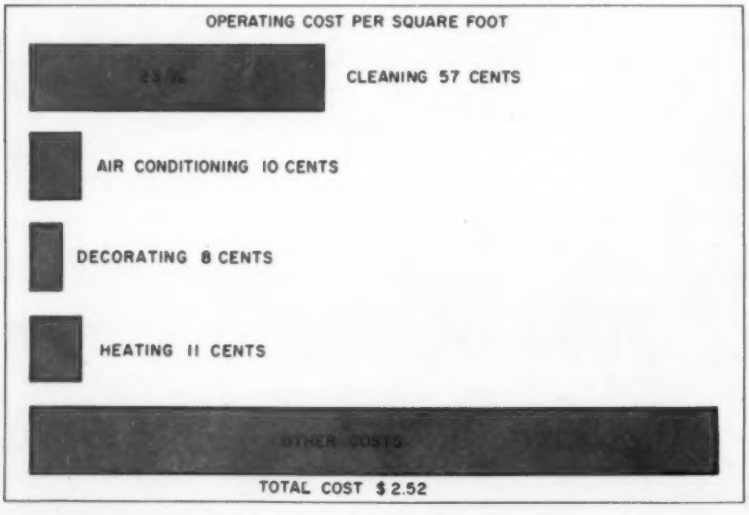
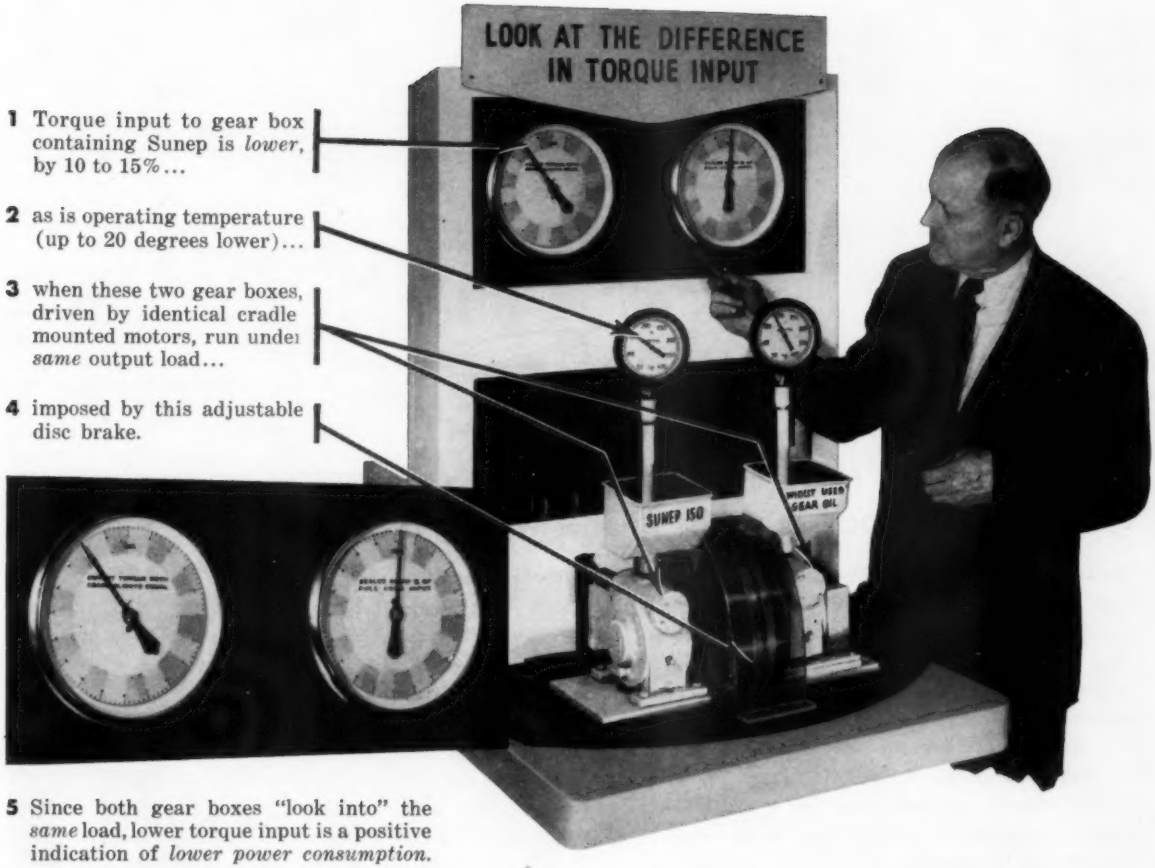


Diagram shows breakdown of average building cleaning cost of $2.52 per sq ft

Such costs frequently do not include "hidden" costs of cleaning ventilating ducts, elevator shafts, control equipment, etc.

Electronic cleaning, which uses the same principle as the conventional electrostatic precipitator, is capable of removing from the air particles, including viruses, as small as 1/1000 microns.

The electronic cleaner is designed to fit into the inlet air duct of an air conditioning system. Dust-laden air flows through the 13,000-volt ionizer section of the cleaner which removes electrons from the dust particle atoms, so that they become positively charged ions. The dust ions then pass through a series of collector plates. Positive ions are attracted to the negative plate and the spare electrons are attracted to the positive plate, while clean air continues on through the system. Accumulated dust is washed away by a water spray. *From a release of Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*


LOOK AT THE DIFFERENCE IN TORQUE INPUT
1 Torque input to gear box containing Sunep is *lower*, by 10 to 15%...
2 as is operating temperature (up to 20 degrees lower)...
3 when these two gear boxes, driven by identical cradle mounted motors, run under *same* output load...
4 imposed by this adjustable disc brake.
SUNEP 150
5 Since both gear boxes "look into" the *same* load, lower torque input is a positive indication of *lower power consumption.*

This test rig proves...

SUNEP CUTS POWER CONSUMPTION, REDUCES OPERATING TEMPERATURES

TIME AND AGAIN, under equal operating conditions, Sunep® gear lubricant has demonstrated its superiority over competitive oils. Sunep is a high-quality, extreme-pressure lubricant that is also recommended for screws and heavily loaded bearings.

In addition to extreme-pressure characteristics, Sunep has the ability to combat rust and corrosion. All additives are compatible and do not drop out during use or prolonged storage. These advantages add up to savings in money and equipment for you.

For complete information about Sunep oils, call your Sun representative or write to SUN OIL COMPANY, Philadelphia 3, Pa., Dept. PY-4.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY Philadelphia 3, Pa.

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For more facts circle 527 on Reply Card

"Buffalo" Style "V" Sky-Vent

"Buffalo" Style "H" Sky-Vent

"BUFFALO" PACKAGE VENTILATION

. . . ON THE ROOF AND OUT OF THE WAY

"Buffalo" Sky-Vent Roof Ventilators provide high-volume exhaust for large plant areas not adjacent to outside walls, or where duct work is impractical. Located on the roof, they do not interfere with future plant modifications or take up floor space. Installation is relatively simple, since "Buffalo" Sky-Vents are delivered as complete packages, including fan, motor, housing, hood and curbing. Already in extensive use, these highly efficient and trouble-free units are available in the two styles shown, with "Buffalo" Propeller or Axial Flow Fans, in 12" to 120" sizes to exhaust 1,000 cfm to 250,000 cfm of hot air, fogs, and fumes. Construction is sturdy, rigid and weather-proof. Write for Bulletin FM-1234 for all details.

. . . OR EASILY MOUNTED IN WALLS, WINDOWS OR OVERHEAD

Husky, efficient "Buffalo" Design 53 Propeller Fans are self-contained, ready-to-run units in 24" to 120" sizes to exhaust 5500 to 250,000 cfm anywhere needed. Their rigid, die-stamped square panels are designed for easy fitting in wall openings or overhead mounting on structural support. Efficiencies and low noise characteristics are unusually good, too, due to the properly shaped blades, slow rotor speeds and close clearance between blade tips and the smoothly curving inner periphery. Available in special construction for a wide range of temperature and corrosive fume applications. Full details in Bulletin FM-315, your copy on request.

"Buffalo" Design 53
Package Propeller Fan

"Buffalo"

BUFFALO FORGE COMPANY

166 Mortimer St. • Buffalo, N. Y.

Canadian Blower & Forge Co., Kitchener, Ont.

Sales Representatives in all Principal Cities

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

For more facts circle 528 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

fold that provides water at 150 F to three 54-in. wash fountains and nine lavatories.

In another area, four wash fountains receive hot water from four heaters, also with a common manifold.

The third area, in which there are three wash fountains, is served by three water heaters with a recovery rating of 126 gpm at 100 F temperature rise.

All the heaters are installed in skylight areas on fabricated metal platforms welded to vertical steel beams 20 ft above the plant floors. Flue connections extend through the plant roof.

The fourth installation of water heaters serves the cafeteria. These three heaters can deliver, simultaneously, into common manifolds, water at 140 F for general purposes, and water at 180 F for use on the automatic dish washer. *From a release of Ruud Manufacturing Co., Kalamazoo, Mich.*

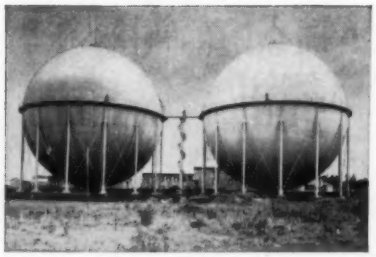
Spiked Bales

Handling waste paper bales was facilitated at Aetna Waste Paper Co., Chicago, by two spikes (arrow) on fork carriage of lift truck, making heavier truck unnecessary. (From a release of Lamson Mobilift Corp., Syracuse, N. Y.)

Quickly Does It

WHAT WAS a time-consuming job of servicing steam traps is now done in 1/20th the time at the Barrett-Christie Co., Chicago, Ill. by using an impact wrench.

Main problem facing maintenance men servicing the traps was in loosening rusty bolts on the outside of the traps, unscrewing a heavily rusted and



經済的

The Japanese

素晴らしい

have a word for it*

驚異的

* ACTUALLY THREE WORDS —English words. One is *great!* Another is *remarkable!* But the most important one: *economical!*

That is how the Japanese who have used it describe USS "T-1" Steel. What they learned about this unique constructional alloy steel is of value to men who design, maintain, or repair factories and the equipment in them.

The Japanese used this exceptionally strong alloy steel to save over 1720 tons of steel in four new, giant pressure vessels in Tokyo. It permitted them to use thinner wall sections safely . . . to build the vessels larger . . . to supply their natural-gas storage requirements with fewer vessels than would have been possible with structural carbon steel.

USS "T-1" Steel's unusually high yield strength (90,000 psi minimum) and its great toughness and resistance to brittle failure made the weight reduction possible. Its ready weldability made it possible to fabricate vessels 110.5 feet in diameter in the field without heat treatment.

What is the significance of all this? Just this: USS "T-1" Steel can add strength . . . or take off weight . . . or improve durability . . . or simplify fabrication . . . or cut the original cost and reduce maintenance of such varied equipment as lift trucks, cranes, hoppers, conveyors, roof trusses, machine foundations, press frames, ductwork, flywheels, jigs, and storage vessels.

Write for our new booklet titled "T-1." United States Steel, Room 5594, 525 William Penn Place, Pittsburgh 30, Pennsylvania.

UNITED STATES STEEL CORPORATION • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA.
UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS "T-1" CONSTRUCTIONAL ALLOY STEEL

"USS" and "T-1" are registered trademarks.

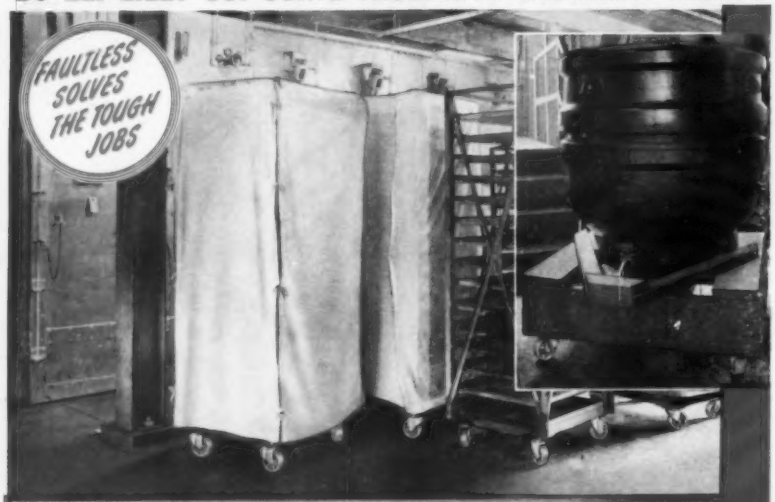
See The United States Steel Hour. It's a full-hour TV program presented every other Wednesday by United States Steel. Consult your local newspaper for time and station.

UNITED STATES STEEL

For more facts circle 529 on Reply Card

NØELTING
Faultless CASTER
MATERIALS HANDLING
FACTS

HIGH TEMPERATURES, EXPLOSIVE HAZARDS ARE LICKED BY ELI LILLY CO. USING FAULTLESS CASTERED TRUCKS



(Above) Powdered drugs are dried in modern high temperature ovens and moved on multi-tiered trucks equipped with Faultless 300 Series Double Ball Bearing Swivel Casters lubricated to withstand up to 600° F. temperatures.

(Above, right) Glass-lined vats containing inflammable liquids are moved easily by one man. Faultless manganese bronze wheels eliminate danger of sparks.

showing two full rows of hardened balls rolling in separate, large diameter raceways. Top plate of heavy steel is anchored to tapered-head King Pin, permitting fine adjustment of the races. An exclusive Faultless feature. All bearing surfaces are hardened steel and all ball bearings are enclosed, making a dust-proof construction.

The Eli Lilly Company is one of the nation's more famous pharmaceutical plants, where a wide variety of products such as polio vaccine, antibiotics, etc., are manufactured in huge quantities. In parts of their modern Indianapolis plant, highly inflammable liquids are used in the manufacture of drugs. Other kindred industries frequently have the problem of safely moving materials through hazardous areas. A spark from an ordinary wheel or truck could result in a disastrous explosion. Many types of handling equipment cannot be used. However, the use of Faultless castered trucks with special spark-proof wheels are frequently the solution in such cases. This type equipment has the advantages of: 1) Non-motorization, 2) High amount of maneuverability for space restricted areas, 3) Low initial, maintenance, and replacement costs, and 4) Complete protection from accidental electrical sparking. Faultless has been a leader in this special safety field for many years, and offers you a wide selection of casters with cushion tread or hard tread, spark-proof wheels.

For latest Caster information, call your Faultless distributor, listed in your phone directory. He can give you delivery from stocks. Both he and nearby Faultless Sales Engineers are available to help you with materials handling problems.

FAULTLESS CASTER CORPORATION, EVANSVILLE 7, INDIANA
Offices in Atlanta, Baltimore, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Grand Rapids, High Point, Indianapolis, Los Angeles, New Orleans, New York, Philadelphia, Portland, Seattle, St. Louis. Canada: Stratford, Ontario.

For more facts circle 530 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

Impact wrench quickly removes rusted bolts from the outside of steam trap

embedded valve seat on the inside, then reassembling them.

The impact wrench was able to remove the valve seat nut which usually is so heavily rusted that, when removed by hand, must be saturated in penetrating oil and allowed to stand for several minutes to loosen. On one particular job it required 15 seconds to remove each bolt on the outside of the trap by hand, but required one second to remove each with the wrench. *From a release of Black & Decker Mfg. Co., Towson, Md.*

Coated Wire Reduces Rejections

WIRE WITH a chemically prepared, non-metallic coating has solved a tolerance problem in making springs for compression spray cans at the Lee Spring Co., Brooklyn, N. Y.

In a free length of 0.942 in. of wire, tolerances of the springs must be held within plus or minus 0.015 in. If these tolerances are not held, the springs may jam in the assembly machines. Piano wire was first used, but rejection rates were high.

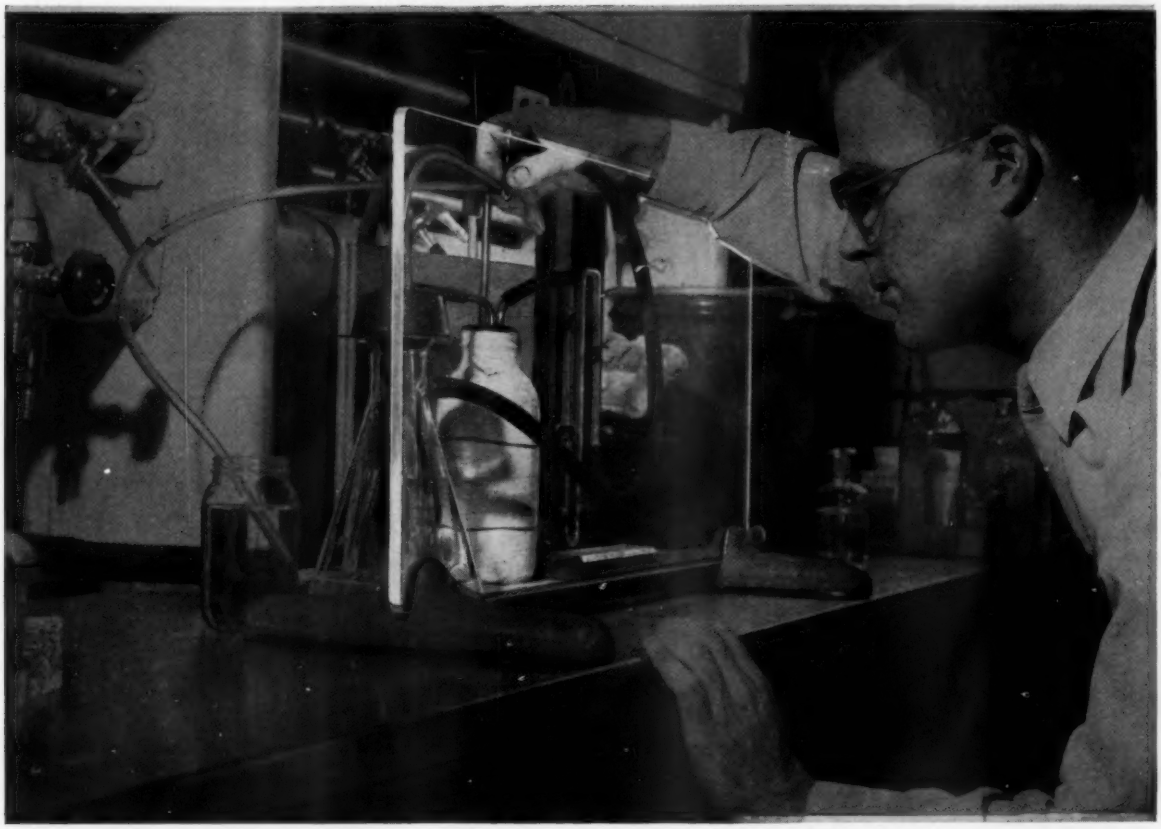
By using the coated wire, the company has reduced rejections to one per cent. *From a release of National-Standard Co., Worcester, Mass.*

Untouched by Human Hand

FILLING SPOUT built into polyethylene film drum liners prevents airborne contaminants from coming in contact with plastic resins being packed in the drums and prevents penetration by moisture or dirt during shipment.

About 48 in. long, the liner is cut

Plexiglas...useful in so many ways around the plant



For safety guards, protective covers, inspection windows, glazing and many other industrial plant uses, PLEXIGLAS® acrylic plastic is a mighty handy material.

PLEXIGLAS is crystal clear and highly impact-resistant. It can be formed to almost any shape, and machined like wood or soft metals. PLEXIGLAS resists corrosive atmospheres . . . weather . . . breakage . . . and has excellent electrical properties.

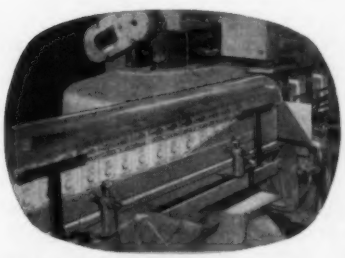
Does the availability of a material with this combination of advantages suggest ways in which it could solve operating and maintenance problems in *your* plant? Your nearest PLEXIGLAS dealer will be glad to be of service. Ask him about PLEXIGLAS R, the lower-cost grade that is so suitable for industrial applications.

Chemicals for Industry

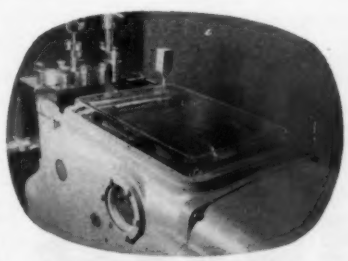
ROHM & HAAS COMPANY

WASHINGTON SQUARE, PHILADELPHIA 5, PA.

Representatives in principal foreign countries



Curved hood of transparent PLEXIGLAS on conveyor line gives clear view of packaging process, protects contents of open packages.



Formed PLEXIGLAS cover on demonstration model of milk homogenizer permits safe inspection of machine parts in operation.

PLEXIGLAS dealers maintain stocks of clear and colored material for prompt delivery, can supply detailed information and expert advice on specific uses. They are listed under PLEXIGLAS in the Plastics section of telephone directories of most large cities.

Canadian Distributor: *Crystal Glass & Plastics, Ltd. 130 Queen's Quay East, Toronto, Ontario, Canada*

For more facts circle 531 on Reply Card

on the job experience proves it . . .

you get the most
for your money when you buy

MATHEWS CONVEYERS

A system of double-deck live roller conveyers handling tote pans in a modern machine shop. Pans are deflected to the machines off the top deck. Empties return on bottom deck.

Whatever the conveying problem might be—whether it involves the handling of cartons, cases, or bags—Mathews builds the equipment to do the job in the best way. You can be sure of a complete service from planning through installation. You get the benefit of over 50 years of experience in **continuous flow** materials handling, and a product that is guaranteed to stay on the job. That is why we believe you get the most for your money when you buy Mathews Conveyers.

MATHEWS CONVEYER COMPANY
GENERAL OFFICES . . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. . . . MATHEWS CONVEYER COMPANY WEST COAST, SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . MATHEWS CONVEYER COMPANY, LTD., PORT HOPE, ONTARIO.

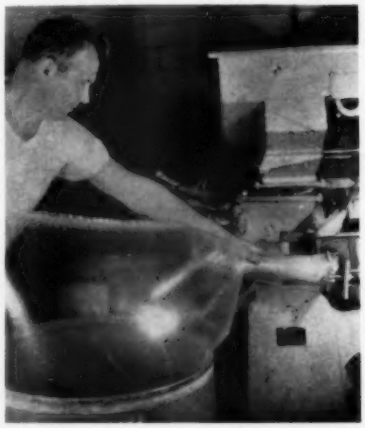
MATHEWS
Fifty Years of Leadership in Mechanized Handling

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 38)

from an extruded tube of polyethylene, 78 in. in circumference. A circle of film is sealed to one of the open ends of the tube to provide a round bottom. Before the other end of the liner is double-sealed in a straight line, a



Sleeve built into drum liner prevents contamination of contents during filling

smaller polyethylene tube is inserted at one corner and sealed to form a filling spout.

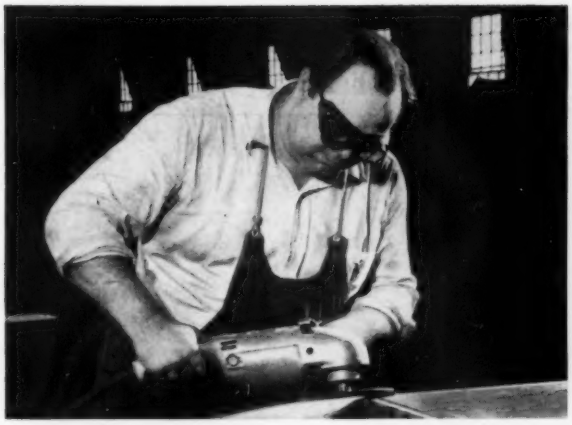
Air blown through the spout inflates the liner to fit the drum. The spout is then connected to the discharge nozzle of a bag packer and the resins pour into the drum untouched. The 8-in. spout is tied off with a knot before being removed from the nozzle. It can also be sealed to provide an airtight closure. *From a release of Bakelite Co., Div. of UCC Corp., New York, N. Y.*

Tailor-Made Cable Splice

LEAD, RUBBER and plastic-sheathed cable, combinations of these, and shielded cable can be spliced in the field by injecting epoxy resin into a mold tailor-made for the splice.

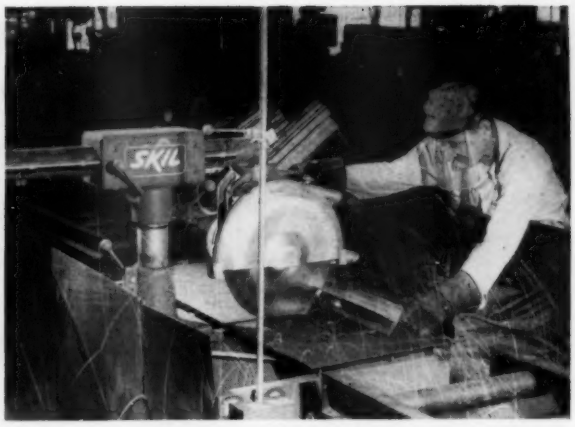
This pressure splice method uses an open mesh, screen-like tape as a spacer material wrapped around the splice, which is covered with a liquid-impervious plastic tape holding an injection fitting to allow entry of the resin into the splice. The plastic tape is, in turn, covered with a low-stretch tape to restrict the expansion of the plastic envelope when the resin is forced into the splice.

To prepare the splice, the insulation is first scraped to remove all wax, oil and dirt. The conductors are then fastened together with a suitable connector and the splice is wrapped with



Saves 30% time

The Columbus Heating & Ventilating Co., Columbus, Ohio, owns an all-around inventory of SKIL tools. The reason: practically no maintenance, lightweight, better balance, adaptability. Mr. Clarence Fine, shop foreman, singled out the SKIL Model 825 Disc Sander as a tool that stands up under continuous operation. "In addition", says Mr. Fine, "it's 30% faster than anything else we've tried."



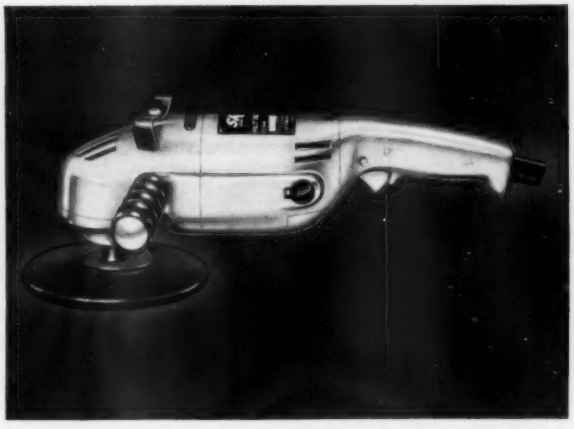
Saves 8 hours labor costs a week

Five years ago, Trailmobile, Inc., Cincinnati, bought a SKIL Model 450 Radial Saw. Since that time four more such saws have been added with these results: "Each one saves us one 8 hour day labor costs per week", says Mr. Herman Suter, portable tool supervisor. "We have eliminated the sanding operation of rough edges caused by a cutting torch."

It's true! You SAVE with SKIL Tools

Saves $100.00 per week

"Our new SKIL Shear paid for itself in the first week", says J. M. McLain, owner of J. M. McLain & Sons Trailer Company, Houston. "In using other makes of shears we found that maintenance costs were about to run us out of business. Some operations were cut from 30 minutes to 1½ minutes. My men like SKIL Shears because they are easier to handle, adaptable, and are cheaper to run."



YOU, TOO, CAN SAVE

NEW! SKIL 7" Model 852 Disc Sander. Save time and effort on the toughest sanding, wire brushing, grinding. New, powerful motor stands up under the heaviest work load. No matter what you have to sand, grind, saw or drill, there's a SKIL tool that can do the job better, faster, cheaper. Ask your SKIL distributor to show you why. Or use the coupon below for further information.

SKIL PORTABLE TOOLS

Made only by SKIL Corporation, Chicago 30, Illinois, Factory branches in all leading cities.

Send for FREE *Booklet on Power Tools*

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For more facts circle 533 on Reply Card

Quaker Oats laboratory puts O.K. on cotton*

**Fairfax Towels used by Quaker Oats Research Laboratory are supplied by Chicago Towel Company, Chicago, Illinois.*

• In a spanking new building in Barrington, Illinois, the Quaker Oats Company, one of America's oldest and most respected food producers, maintains a complete research laboratory. Just as its research problems are related to today's (or tomorrow's!) modern living, so are all facilities as up-to-date as possible. And that includes cotton towels for drying laboratory glassware.

Cotton towels are quick-drying and lintproof. They help to maintain a neat, clean environment at low maintenance cost.

Why not try cotton for the towel job in *your* plant? For free booklet on how cotton towel service will help you, write Fairfax, Department P-4, 65 Worth Street, New York 13, New York.

Here's How Linen Supply Works...

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, automatic supply of freshly laundered towels and uniforms. Just look up LINEN SUPPLY or TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels...

Sure Sign of Good Management

Fairfax Towels

WEST POINT TEXTILES — WEST POINT MANUFACTURING CO.

WELLINGTON SEARS COMPANY, 65 WORTH STREET, NEW YORK 13, N. Y.

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

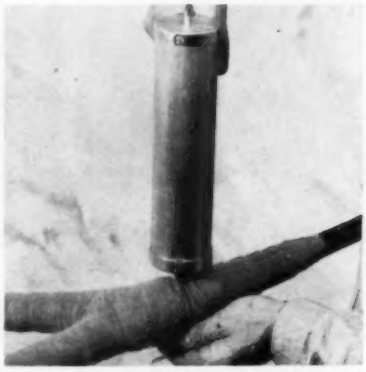
(Digest begins on page 38)

the spacer tape to the required splice diameter.

The plastic injection fitting, with its one-way, non-return valve, is positioned at the proper point on the splice. The plastic tape envelope is wrapped over the apron of the injection fitting to secure it in place. Over the plastic tape is wrapped a layer of fabric tape to give the stretchy plastic added support against the pressure of resin.

With the fabric tape secured, the

Fitting through which epoxy resin will be injected is secured by plastic tape.

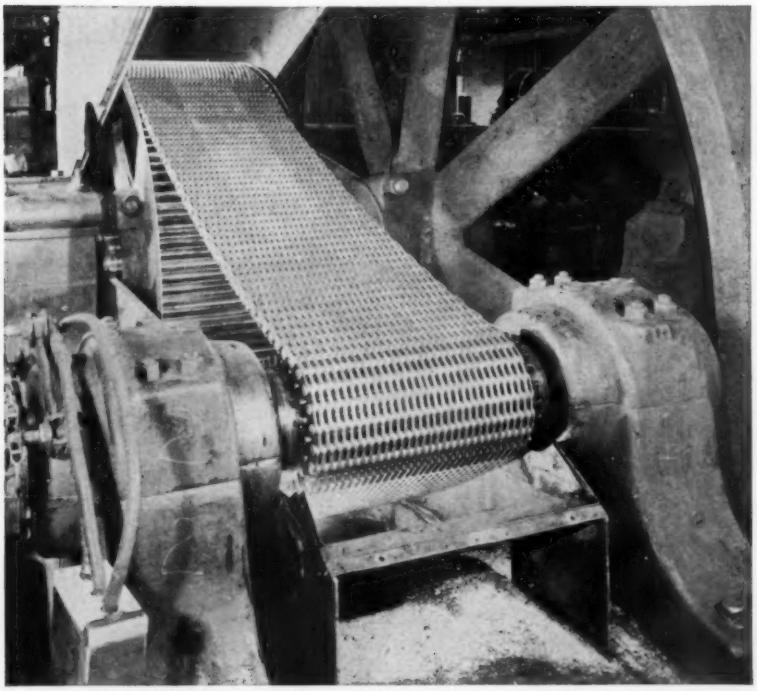


Pressure gun nozzle is inserted into injection fitting to force resin into mold

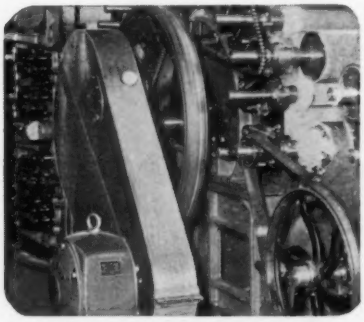
resin is injected into the mold by means of the pressure gun. When the resin begins to drip from several pin holes previously punched in the splice casing at the ends furthest from the injection fitting, the splice is fully impregnated.

External grounds may be attached before applying the spacer tape and parallel exit of cables from the splice can be arranged by padding cables into place with insulating putty before making the splice. *From a release of Minnesota Mining and Manufacturing Co., St. Paul, Minn.*

Here's the record of LINK-BELT silent chain

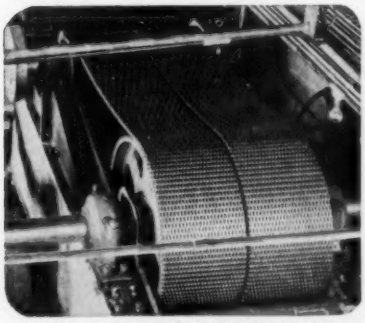


How do your drives compare?

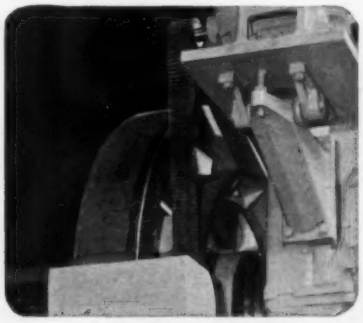


... IN SEVERE SERVICE. Link-Belt silent chain driving from a 450-hp motor easily handles the high load requirements of this merchant mill. These drives are often lower in first cost, always lower in ultimate cost — due to minimum maintenance requirements, long life and positive action which eliminates power losses due to slippage.

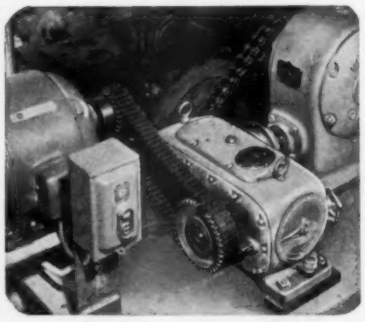
... UNDER ADVERSE OPERATING CONDITIONS. Humidity, heat, cold do not lower this chain's better than 98% efficiency.



... AT LARGE OR SMALL HP. A versatile line, these drives are available from fractional to thousands of hp.



... WITH LARGE RATIOS. Operates efficiently on extremely short centers at ratios as high as 10-to-1.



... IN LIMITED SPACE. Easy to assemble in close quarters, silent chain permits built-in drives, compact housings.

... AT HIGH SPEEDS. After 13 years on this newspaper press at speeds up to 4700 fpm, silent chain is still efficient.

For more details and advantages . . . for complete selection and technical data — ask your Link-Belt office or authorized stock-carrying distributor for a copy of 88-page Book 2425.

LINK-BELT

SILVERSTREAK SILENT CHAIN DRIVES

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 14.038

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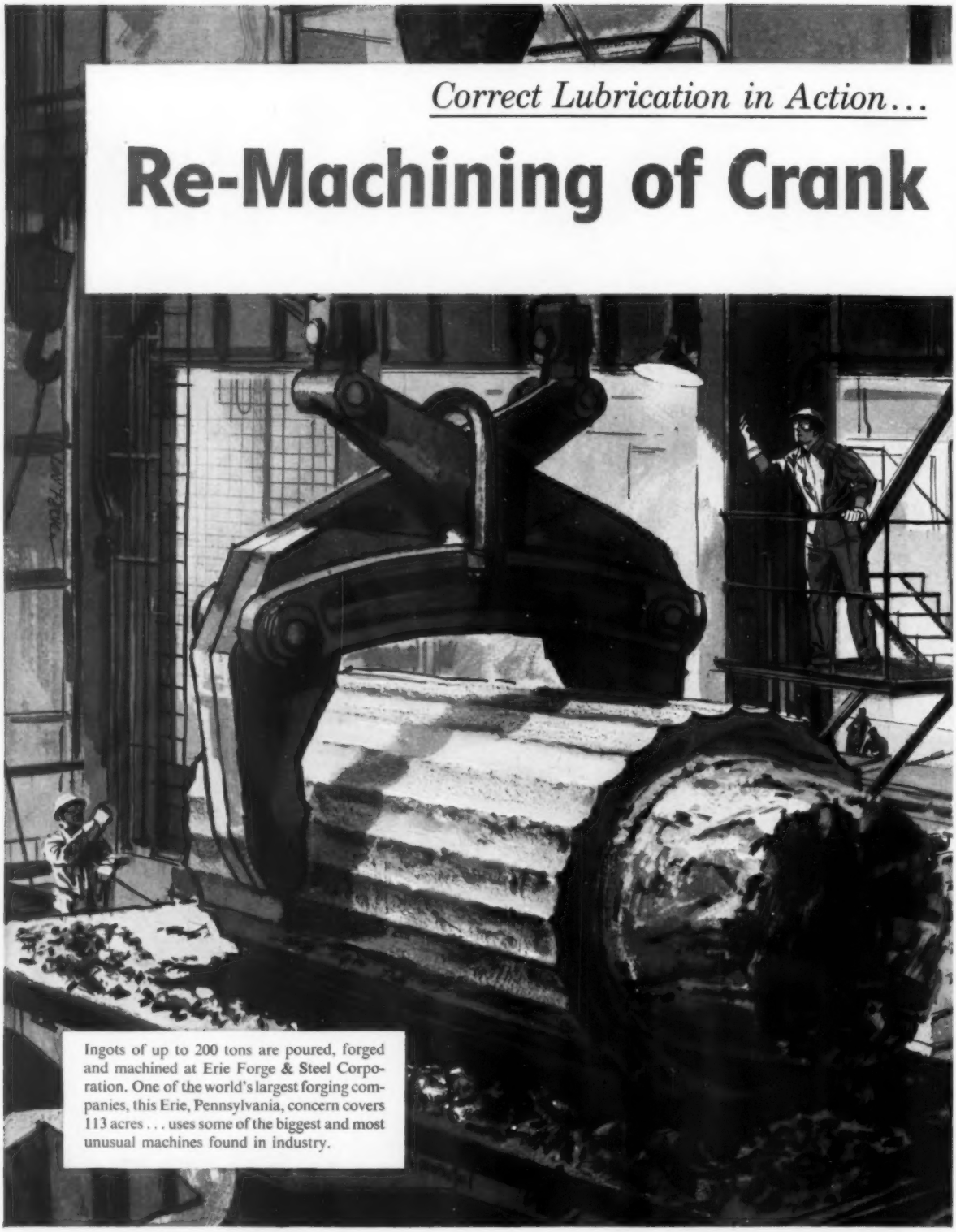
Correct Lubrication in Action...

Re-Machining of Crank



Ingots of up to 200 tons are poured, forged and machined at Erie Forge & Steel Corporation. One of the world's largest forging companies, this Erie, Pennsylvania, concern covers 113 acres . . . uses some of the biggest and most unusual machines found in industry.

Mobil

SOCONY MOBIL

Leader in Lubrication for over 91 years

in the **Forging Industry**

shaft Pins Eliminated

–$30,000 SAVED!

One of many ways Erie Forge & Steel Corporation has cut production costs over $100,000 through the help of Socony Mobil

At Erie Forge & Steel Corporation, where the world's largest crankshafts are produced, equipment and methods are constantly scrutinized for ways to increase production and reduce maintenance costs. Plant records show how Socony Mobil has helped.

For example: During machining of Diesel crankshaft pins, metal particles welded to cutting tool tip. This excessive build-up resulted in rough finish of pin surfaces. This necessitated re-machining of up to 18 crankshaft pins a day.

A Mobil lubrication engineer analyzed the operation . . . recommended a special Mobil cutting oil. Rough finish trouble disappeared, resulting in savings of $30,000 in one year. *This one saving alone more than paid for the plant's annual cost of lubricants.*

This is Correct Lubrication in Action—the *only* program that combines 91 years of lubrication knowledge with the most experienced lubrication engineers and quality products. Why not find out how it can cut your operating costs?

This complete cost-cutting service can be yours!

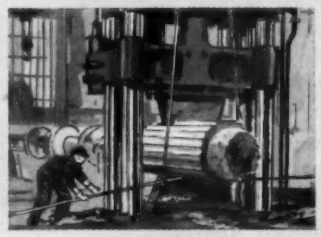
After a Mobil representative thoroughly analyzes your plant's lubrication needs, a program of Correct Lubrication is put into action. Here are some of the ways this program benefited the Erie Forge & Steel Corporation.

World's Greatest Lubrication Knowledge—Since 1866, Socony Mobil has worked with every type of industry, on every kind of machine operation. **This vast experience enabled Mobil to suggest a cleaning method to Erie Forge that eliminated monthly dismantling of hydraulic and circulating systems . . . saved $49,719 in four years.**

Continuous research and product development—Socony Mobil products are continually improved . . . new products developed to meet industry's latest needs. **A new Mobil extreme-pressure gear lubricant was recommended for Alliance 75-ton cranes. It cut wear under overload conditions . . . prolonged gear life . . . saved $1,500 in labor and material cost.**

Periodic product analyses—This service provides a thorough check on lubricant and machine performance . . . can detect trouble before it reaches the serious stage. **Analyses of samples taken from central coolant system at Erie Forge indicated bacterial contamination. Steps were taken to arrest condition, thus avoiding shutdown of all boring and sawing operations.**

Experienced engineers—Mobil engineers work closely with plant personnel . . . can call on years of practical experience to cut plant production costs. **At Erie Forge & Steel Corporation rams on hydraulic presses had to be repacked every two weeks due to high-temperature operation. Recommendation by Mobil engineer greatly extended packing life . . . cut labor costs . . . saved $20,000 in four months.**



Correct Lubrication **A proved program to reduce maintenance costs**

SOCONY MOBIL OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM CO., GENERAL PETROLEUM CORP., MOBIL OVERSEAS OIL CO., INC.

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5 *full working* days of materials handling...

at the 7th NATIONAL MATERIALS HANDLING EXPOSITION and CONFERENCE

Convention Hall, Philadelphia, April 29-May 3, 1957

Attend the Conference too!

An outstanding industrial conference sponsored by the American Material Handling Society... down-to-work sessions that hit at the practical aspects of materials handling problems in your plant.

The BIG Show... aisle after aisle of machines, equipment, supplies and services ... exhibits of the leading manufacturers ... showing you a better and less costly way of moving it.

The BALANCED Show... everything in materials handling ... from heavy giants to the simplest devices ... numerous active demonstrations ... all headlined to make your plant operation more efficient and less costly.

The COMPLETE Show... where you can go to buy or go to browse ... where you'll see how others solved problems ... talk to experts ... pick up scores of ideas.

Plan now to attend! **Write for free exposition cards and information about the conference to:**

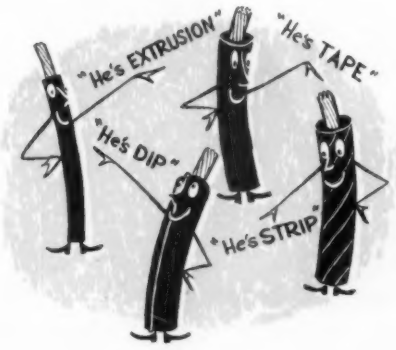
MATERIALS HANDLING EXPOSITION
CLAPP & POLIAK, INC., *Management*
341 Madison Avenue
New York 17, New York
MUrray Hill 4-3432

Listen, friends, to the hideous fate of the man who learned about cables too late

Lucius K. Watt was an engineer
He was eager and honest and able,
And one of the things he did for his firm
Was to buy electrical cable.

Now he knew all the people at Okonite
But with orders he'd seldom reward 'em,
"Because," he would state, "the cables are great
But who in the world can afford 'em?"

(Now that was a fault of the late Lucius K's—
That he had such a silly illusion;
For Okonite insulates cables *all* ways:
Strip, taping, dip and extrusion.



Only Okonite uses all methods, you see—
Our prices are *not* always highest;
And thus when you ask us what cable to use
Our recommendation's unbiased.)

So Lucius K. Watt went out and he bought
A cable he heard was a bargain
And this was too bad, for Lucius was had . . .
By some Madison Avenue jargon.

The thing was installed (with a minor defect)
In a most inaccessible place;
When Lucius K. Watt went out to inspect . . .
The cable blew up in his face!

We hate to relate this horrible fable
But here is the moral for all:
If you should desire a superior cable—
By extrusion or strip . . . by taping or dip
Just write us a letter, or call.

No matter *what* insulation or method of application you want (and we use them all) you'll get the best of its kind from Okonite. For a frank, down-to-earth discussion on cable insulating methods, write for Bulletin PE-1106, The Okonite Company, Passaic, N. J.

where there's electrical power . . . there's **OKONITE CABLE**

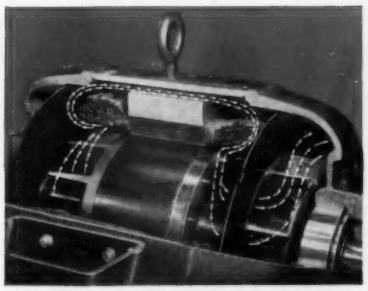
4754

For more facts circle 538 on Reply Card

NEW ROBBINS "SERIES 254U" RE-RATED FIVE BIG

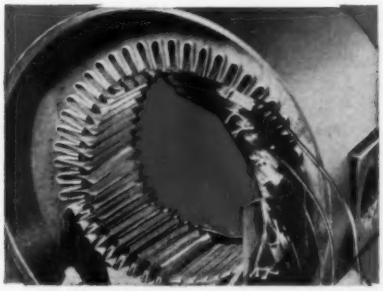
FULL HEIGHT END HEAD PROTECTION
One piece shrouded end heads give full height protection against moisture and falling objects. Internal baffles complete splash-proof construction.

& MYERS MOTORS offer you... ADVANTAGES!



"STRAIGHT THROUGH" DUAL-SWEEP VENTILATION ELIMINATES "HOT SPOTS"

Tandem fans, one pushing and the other pulling, produce washing action around and over field coil ends, insure lower internal temperatures and longer dependable operation.



MYLAR* INSULATION INCREASES MOTOR LIFE. Mylar*, laminated to rag paper insures positive insulation and assures virtually permanent protection because of its excellent dielectric qualities. In addition, the rag paper backing provides a cushioning effect for added resistance to abrasions and punctures.

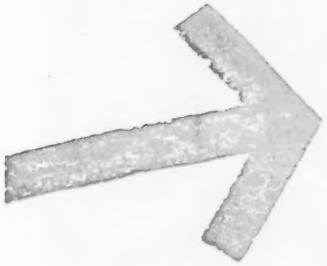
*DuPont registered trademark.

BEARINGS EASILY INSPECTED

Removable cover plate at each end of head permits easy bearing inspection without dismantling motor. Bearings run in double-width races, thus have extra-large reservoirs containing grease selected to resist dust, temperature, humidity and high operating speeds.

PERMANENTLY NUMBERED LEADS SIMPLIFY INSTALLATION AND MAINTENANCE

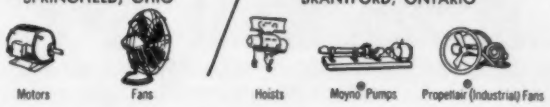
Proper lead identification is assured even after years of exposure. Numbers are permanently impregnated into the sub-surface of the insulation . . . can't wear off or deteriorate.



THESE five big advantages make R&M's "Series 254U" re-rated motors your best buy for applications requiring dependable, full-time performance. They can be installed in any environment, outdoors without a cover or in damp and corrosive atmospheres. Moisture, rust or corrosion can't affect their operation, and they take rugged duty in stride! Every R&M motor is electrically and mechanically designed to withstand the most severe operating conditions. Careful quality control and precision manufacture insure top performance and dependability year after year. Write today, for R&M Bulletin 520 PEon R&M's "Series 254U" re-rated motors!

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO | BRANTFORD, ONTARIO



For more facts circle 539 on Reply Card

OPERATION AND PRODUCTION pointers for the industrial plant engineer

Edited by H. E. B. Anderson

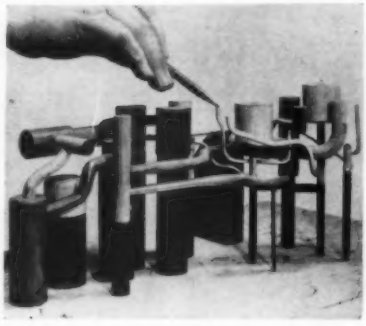
Small-Bore Cores for Castings

SMALL, INTRICATELY SHAPED, unlined passageways in aluminum and magnesium alloy sand castings are being cast with a new sheathed-tube core, developed and in use the last year by Howard Foundry Co., Chicago.

The new core consists of a preformed metal tube, sheathed in a flexible refractory sleeve. Both the tube and the sleeve are removed after molding the casting. The tube is dissolved out by a chemical agent, while the sleeve is removed manually. Aluminum and magnesium alloys are not affected by the chemical.

The sheathed-tube core is being used in combination with ordinary sand cores, but only when it is impossible to mold a passageway with a sand core or when sand coring costs are higher.

Although minimum practical sand core diameter is ¼ in., the rigidity and dimensional stability of the sheathed-tube core makes possible the casting of ⅛-in.-diameter passageways, up to 16 in. in length.



Core mock-up, consisting of 17 individual cores, shows sheathed-tube coring

With the new core, passageways for transmitting oil, fuel, coolant and hydraulic fluids can be internally wrapped around a large cylinder in one continuous line. As a result, fluid lines need not be attached to exteriors of cast components — an operation which requires drilling a series of holes.

Punched Cards Help Make Steel

INSTALLED on a reversing roughing mill at the Allegheny Ludlum Steel Corporation's Brackenridge, Pa. Works, what is believed to be the first card-programmed preset control in the steel industry is being used in the production of electrical steels.

Developed by General Electric laboratories and built by their Industry Control department, the system is capable of controlling 15 programmed passes from a single card at accuracies of approximately 0.01 in.

The control utilizes an electronic counter, which is preset by punched card data, to regulate the screwdown

(Continued on page 58)

Cut-Off Machines in Dual Mounting Cut Miters in Molding

IN THEIR Dover, N. J. plant, the Reliance Picture Frame Co. cuts 8,000 board feet of lumber per day, to make 13,000 frames. In one operation, Reliance used Delta cut-off machines, and they have designed a special setup for the particular application. Two cut-off machines are mounted on a single stand, to make two miter cuts simultaneously. With only one operator necessary to feed the machine and make both cuts, the setup has resulted in a 25 per cent saving in manhours.

To get the blades of the two cut-off machines close together and cut down the length of the waste piece between the two miter cuts, Reliance personnel moved the blade, belt and pulley of one machine to the opposite end of the drive motor.

The machine operator places a length of frame molding against a stop on the machine which determines the length of the piece to be cut. Pressing a foot pedal actuates the dual machines, bringing both blades down on the length of molding. Releasing the pedal permits the blades to rise again, taking the stop with them, so the operator can easily remove the workpiece.

A guard, shown in the photographs, encloses the top and sides of the machines, which are products of the Delta Power Tool Div., Rockwell Manufacturing Co.

Fig. 1. Cut-off machine makes two miter cuts in wood molding at one time, when operator depresses foot pedal

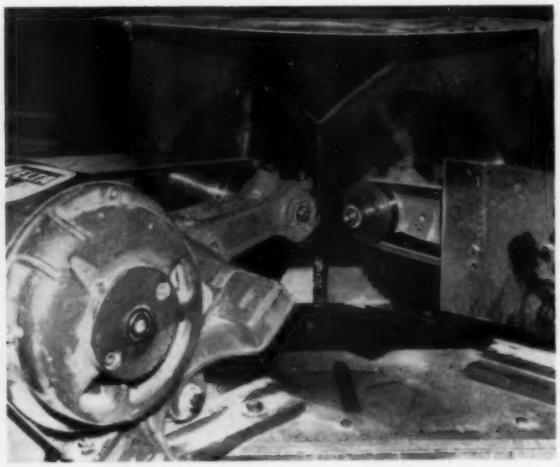


Fig. 2. Rear view of dual cut-off machine shows mounting of motors on single table for simultaneous miter cuts

Hall Industrial Water Report

VOLUME 5 APRIL 1957 NUMBER 2

A New Broom Sweeps Water Clean

Coagulant aids are not new, but, just as in the old saying, the newer types of coagulant aids are helping the common coagulants to sweep water freer of suspended matter at lower chemical and operating costs and higher clarifier flow rates. The cleaner water solves problems wherever water is used; in boilers, municipal systems, cooling systems, waste disposal, oil well floods. Hall Laboratories engineers are fully informed on what various aids can do and are ready to help you with your clarification problems.

Flow Rate Doubled With Coagulant Aid

Carryover of floc from large clarifiers in a southern plant was a serious problem because the suspended material adsorbed from the water the glassy phosphate added for control of corrosion in the extensive cooling system.

Water used for cooling purposes was clarified with ferric sulfate and ground calcite. There were no filters, so good clarifier operation was essential. But the floc formed was so fragile and had such poor settling characteristics that the plant operated at one-half capacity part of the time to avoid losing the sludge blanket. During these periods one-half of the cooling water used was not clarified.

Hall Engineers M. C. Scott and V. M. Marcy substituted 6 ppm of a Hagan Coagulant Aid for the calcite. The large, tough floc resulting permitted operation of the clarifiers at full load and with greatly reduced chemical feed.

A water of satisfactory quality is now being produced at a saving of approximately 50 per cent in chemical cost. As a bonus, there are potentially greater savings resulting from the improved water conditions and protection from corrosion.

From Muddy River To Deionized Water

The water used in the electrolytic tinning lines at a Pennsylvania steel mill must be free from suspended material and low in dissolved solids. To make water of such high quality requires complete clarification and deionization.

Until approximately a year ago the first important step of removing suspended matter from the muddy river water was accomplished with aluminum sulfate and lime in clarifiers. The quality of the water going to the deionizers was not all that it should be because the sludge blankets were sensitive to increase in upflow rates and there was trouble with settling of floc.

Hall engineer D. E. Noll recommended the use of a Hagan Coagulant Aid to improve clarifier operation. Results were successful. The sludge blankets stabilized and the floc toughened and settled more rapidly. Time-consuming jar testing previously used for control has been completely eliminated. Feeds of aluminum sulfate and lime were reduced approximately 30 per cent with corresponding reduction in chemical handling and storage space.

An additional saving resulted from reduction in regeneration chemical cost at the deionizing plant. Coagulant aid has surely carved a niche for itself in this plant.

Clarifying Potable Water

A Western Pennsylvania municipal water plant had trouble with floc formation when clarifying with lime and aluminum sulfate. This plant clarifies and filters 15 to 20 mgd of river water in a conventional sedimentation basin. Coagulant aids have eliminated the difficulty. Operating experience showed that both activated silica and a Hagan Coagulant Aid greatly improved floc formation at approximately the same chemical cost. The plant chose Hagan Coagulant Aid because operating cost was reduced by dry-feeding it in comparison with the more time-consuming task of preparing the activated silica sol.

An Aid to Silica Removal

Turbidity in the effluent from the hot-process unit was affecting silica removal at a paper mill in Virginia. Carryover of suspended material became particularly severe on sudden load surges. Often the particles were so finely divided that they passed through the anthracite filters to the paper mill boilers.

The raw makeup water for the 600-psig boilers contains 230 ppm bicarbonate, 30 ppm silica, practically zero hardness, and about 3 ppm of naturally occurring phosphate. Hydrogen cycle exchangers reduce the high alkalinity, while the following treatment with caustic soda and magnesium sulfate and oxide in the hot process unit reduces the silica concentration of the filter effluent to about 2 ppm.

Hall engineer C. F. Raines decided to try a Hagan Coagulant Aid for better settling of suspended matter in the hot-process unit, even though there had been no previous experience with the Hagan aid for such an application.

A few ppm produced amazing results. The effluent from the unit was clear even before filtration and the filter effluent was sparkling clear.

In addition to reducing sludge carry-over, the 8-10 ppm coagulant aid feed resulted in the same degree of silica removal with 15 per cent less magnesium salts.

Both the plant operating staff and engineer Raines are justifiably pleased with the truly outstanding improvement in water conditions.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information write, wire or call Hall Laboratories, Division of Hagan Chemicals & Controls, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Hall Laboratories—Consultants on Procurement, Treatment, Use and Disposal of Industrial Water

For more facts circle 540 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

position of the mill rolls. Feedback compares the roll position with the preset value, the error in position is converted to a proportional signal and the screwdown drive is actuated to correct the roll position.

Eliminating the need for manual adjustment, the new system itself controls the setting and speed of the rolls. As a result, they are positioned more accurately and variations in performance by different operators are eliminated, thus making possible a more uniform quality of steel.

Punched card control also enables the operator to maintain on file a large number of schedules for a wide variety of products and permits a rapid change from one schedule to the next.

Dipping Dustproofs Bricks

A NEW PROCESS has solved a problem created by dust which results from handling silica brick used in electric arc furnace construction. Developed by the Timken Roller Bearing Co., the process involves dipping the brick into a solution of Orzan A, a chemical product from wood pulping produced by Crown Zellerbach Corp. The result is a complete absence of silica dust in the brick laying area, with no adverse effect on brick life or refractoriness.

Truck fitted with special handling rig dips pallet load of bricks into binder solution. Dipping takes 45 seconds

Several materials, including paint, plastics and oil were tested for their ability to bind the loose silica particles to the brick surface to prevent dusting. However, water solutions of dry binders proved most effective in eliminating the dust arising from handling the brick, and of the dry binders tested, Orzan A was selected. Several qualities make it desirable. It is inexpensive and readily available, water soluble, easily applied by immersion or spray and it dries rapidly to form a resinous coating. Also, it contains no alkali, leaves no harmful residue and except for a minor 0.9 per cent of its original weight, binder burns out completely.

The dipping operation, simple in execution, costs less than half a cent per brick. Brick in original stacks on pallets are dipped into a pound-per-gallon solution of the binder which dries to a dust-proof resinous coating.

Simple, Effective Plant Maintenance Program

Contributed by H. Perina

INEXPENSIVE to implement and control, a plant maintenance program can be set up with four basic performance steps.

1. Assign a number to each machine in the plant, whether it is in use, in dead storage, or slated for sale. Numbered signs approximately five inches by eight inches, can be sheared from any light gage steel. Painted yellow, with three-inch black numerals, the signs can be fastened to the electrical conduit of the machine, using a conduit clamp, screw, lock-washer and nut.

2. A Nomenclature and Maintenance Record Card should be filled out, describing each machine and all plant equipment requiring maintenance.

When repairs are made, the type of repair, order number, cost (labor, material and burden) and date of repair are recorded.

Lubrication is similarly logged. The cards should be placed in a transparent folder and attached to the machine,

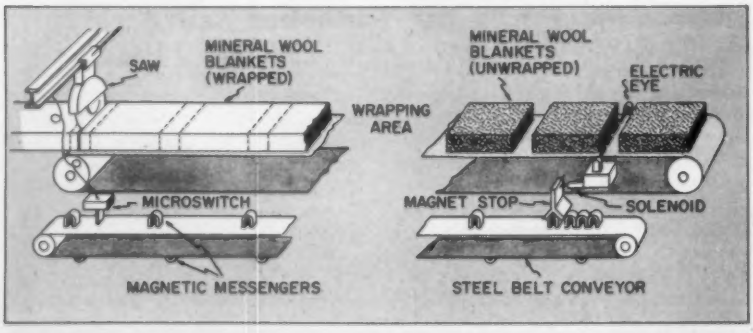
(Continued on page 60)

Electric Eye, Steel Belt and "Magnetic Messengers" Team Up To Control Cutoff Saw

TO AVOID manual wrapping of individual units, the Mineral Wool Insulation Co., Fontana, Cal., wraps mineral wool blankets automatically in one continuous strip as they move along on a packaging conveyor.

The resultant problem—how to cut the wrapping apart at the spaces between the blankets—was solved by "magnetic messengers," as reported by Sandvik Steel, Inc., Fair Lawn, N. J.

A remote control device was designed for the application, comprising: an electric eye at the start of the packaging line; a one-inch-wide steel-belt conveyor, traveling at the same speed as and parallel to the packaging conveyor; permanent magnets which are carried by the steel belt; and a limit switch control which operates a cut-off saw to cut the wrapping between batts at the end of the line.

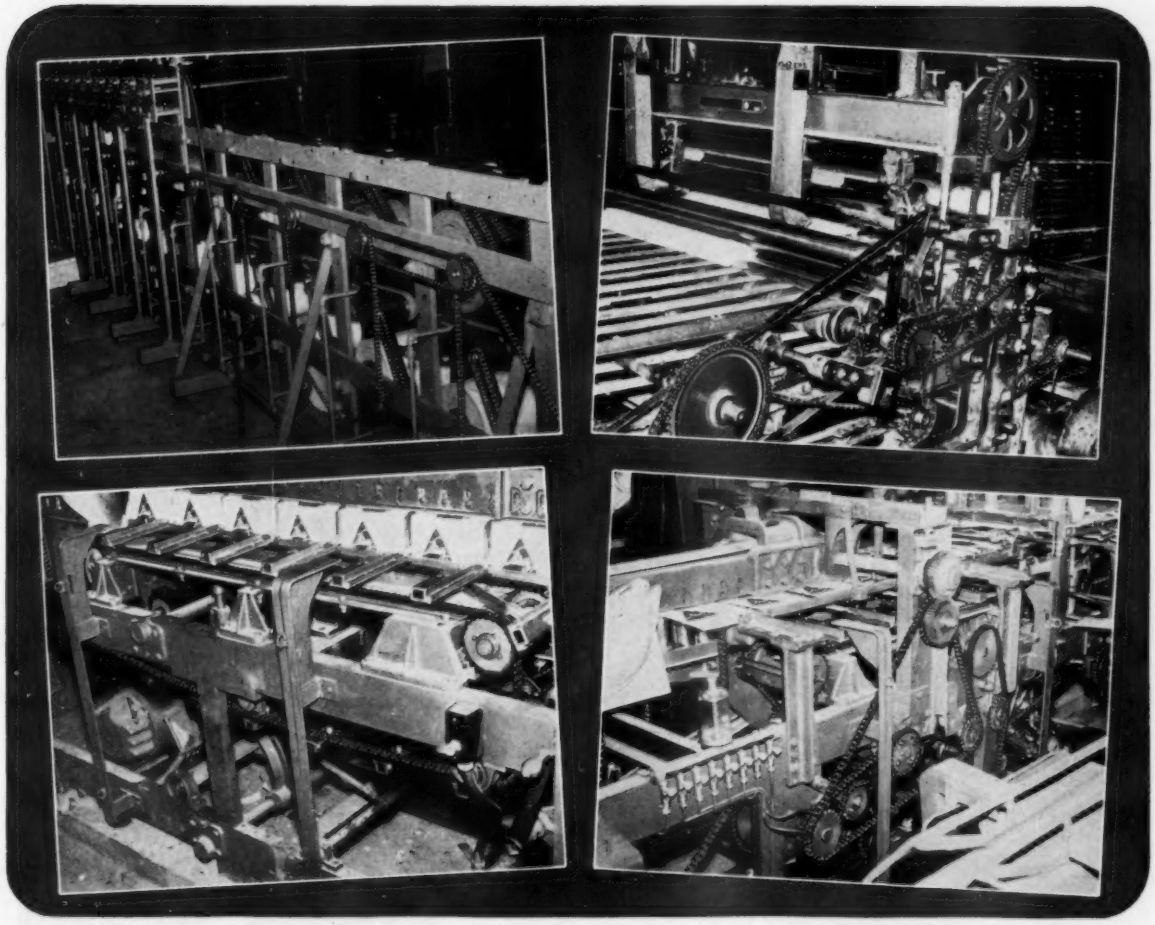


Schematic diagram of conveyor setup, with wrapping area deleted. Positions of magnets on upper steel belt strand correspond with spacing between blankets

The messengers are magnets, riding on the steel belt, which are held back by a stop controlled by a solenoid, as shown in the sketch. As blankets move along the packaging conveyor, before wrapping, the beam of the electric eye passes between the individual batts, closing the circuit that operates the solenoid on the magnet stop. Thus, a magnet is released for each gap in the blanket line.

Moving along the steel conveyor at the same speed as the mineral blankets move along the packaging conveyor, the magnet triggers the limit switch at the far end of the wrapping area. Tripping the switch actuates the saw which cuts the wrapping apart, in the space between the blankets, without damage to the contents, and without human supervision.

The magnet then rides the return strand of the steel belt, around the tail pulley and "lines up" with the other magnets held by the stop.



The Long-Life High Efficiency...98%-99%

Cuts Power Waste

If you have only a few—or several hundred drives in your plant—savings in power consumed every hour, day, month and year—add up to many dollars . . . such dollars add to income as surely as getting equivalent extra dollars for the products you make.

In addition to such important savings, Diamond Roller Chain Drives maintain 100 per cent speed ratios—no slipping occurs, no time-consuming adjustments to make. The result is continued maximum output from Diamond driven machines.

The wide preference for DIAMOND is based on many years of performance—their uniformity of quality—great reserve strength—lasting dependability. To have roller chain and sprocket data handy, write for Catalog 757.

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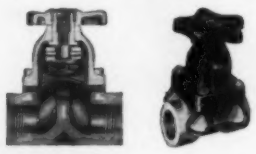
FOR HOT CORROSIVES:
ACE TEMPRON

Heat-resistant nitrile hard rubber pipe handles inorganics at 250-275 deg. F. . . . also resists wide range of organic chemicals at room temperature. Sizes 1" to 8", *Bulletin 96-A.*

Only the Right piping can deliver a "GOOD RUN"

For profitable runs you must keep equipment "on stream" full time with no corrosion shut-downs. Protect your profits with Ace piping, pumps, valves, and tanks. Many rubber and plastic materials . . . backed by a century of chemical experience. Get facts today from American Hard Rubber Company.

VALVES
for all-plastic piping systems



Trouble-free plastic diaphragm valves . . . choice of general-purpose ACE-ITE, ACE PARIAN (polyethylene) or ACE SARAN. Handles most corrosive chemicals and food ingredients. Sizes ½" to 2", 50 psi. at 77 deg. F. *Bulletins 80 and 351.*

RIGID VINYL . . . STRONG, AGE-PROOF

ACE RIVICLOR is a new rigid threaded plastic pipe with good aging and high impact strength. Not affected by most inorganic acids and alkalis, also excellent for many organics. Sizes ½" to 4". *Ask for Bulletin CE-56.*

TOUGH ACE-ITE PLASTIC PIPE

General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*

STAYS TOUGH AT SUB-ZERO TEMPERATURES

ACE PARIAN . . . odorless, tasteless, rigid polyethylene. Best chemical resistance of any plastic at room temp. except to acetic acid. Excellent impact strength at sub-zero temp. Rigid pipe ½" to 2". *Bul. 351.*

ACE processing equipment of rubber and plastics

AMERICAN HARD RUBBER COMPANY
93 WORTH STREET • NEW YORK 13, N. Y.

For more facts circle 542 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

or kept in a file in the supervisor's office. A duplicate set of cards would be informative for the industrial engineering department to aid them in processing jobs, especially if the cards show capacities, speeds and feeds of the machines in question.

3. Place repair parts catalog in an individual folder for each machine and mark the machine number and type on the folder.

4. Each day, the maintenance men should fill out a daily maintenance report which is turned in to his supervisor, who evaluates the number of hours, and the amount of money spent for each machine, and enters this information on the maintenance record card.

Mobile Cafeteria For Fast In-Plant Feeding

A ONE-MAN MOBILE cafeteria, introduced by Dodge Div., Chrysler Corporation and Mobilteria of Detroit, should prove to be a workable answer to mass-feeding problems in industrial

As unit slides out of truck van, retractable wheels move into vertical position

plants. Equipped with hot oven, steam table, coffee urns, refrigerator, pastry and candy compartments, the pushbutton-operated, stainless steel cafeteria unit can provide complete meals to 1,000 people in less than two hours.

Only one operator is required to take this complete meal service to customers. He can drive the Mobilteria to any designated area, park it, press a button to open the van's rear doors, and press another button that starts the cafeteria unit moving out the rear of the van into position. In forty seconds, the unit is ready for operation.

The compact cafeteria unit—10 ft, 7 in. long and 5½ ft wide—is mounted

A coating in COLORS that really sticks to new Galvanized, Aluminum and Terne Plate

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Remember? If you didn't go over every square inch of new galvanized metal with a chemical solution before painting . . . chances are that the paint "peeled off" leaving you with a costly eye-sore!

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Pioneered, developed and field-tested by the Rust-Oleum Corporation — you have the assurance of a *brand name* backed by over thirty-five years of proved performance throughout industry. Try Galvinoleum . . . write for your illustrated Galvinoleum booklet with color charts.

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Philip Morris calls for...

Marley Double-Flow Aquatowers*

Philip Morris sells quality, buys quality. By specifying a Marley Double-Flow Aquatower to provide cooling water for the air conditioning system at its Louisville plant, the company recently bought top performance, operational flexibility, power economy and minimum maintenance—all in one trim package.

The unit purchased was a 2-cell Double-Flow Aquatower—a unit unequalled in the field of intermediate-capacity cooling for *flexibility*. The operator has as many options as there are varying cooling requirements. He can shut down either cell for routine maintenance while the other continues to operate. Water loading can be varied as desired with no changes in performance. Pump horsepower requirements, too, are always held to a minimum by the low silhouette design and Marley's unique distribution system.

As goes Philip Morris, so go industrial concerns everywhere for the Double-Flow Aquatower's flexibility and big-time performance with small-time upkeep. May we send you our bulletin DFAQ so you can see for yourself why the Double-Flow Aquatower is far-and-away industry's first choice for intermediate-capacity cooling?

*Trademark Reg. *U. S. Pat. #2776121

MARLEY

The Marley Company

Kansas City, Missouri

For more facts circle 544 on Reply Card

OPERATION—PRODUCTION

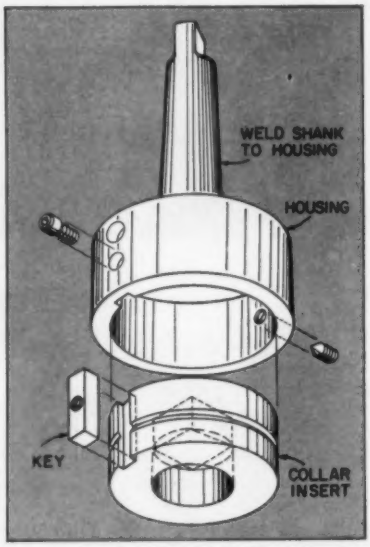
(O and P begins on page 56)

on a rolling rail within the van of a one-ton Dodge truck. Completely safe and automatic, it slides in and out of the van on chain-driven power from the truck battery. Retractable wheels support the outer end of the unit while the rear rests in the van.

Universal Tap Holder

Contributed by Alva S. Swartz
The Carborundum Company

TAPPING HOLES of diameter larger than one inch has generally been done in our shop by using makeshift holders



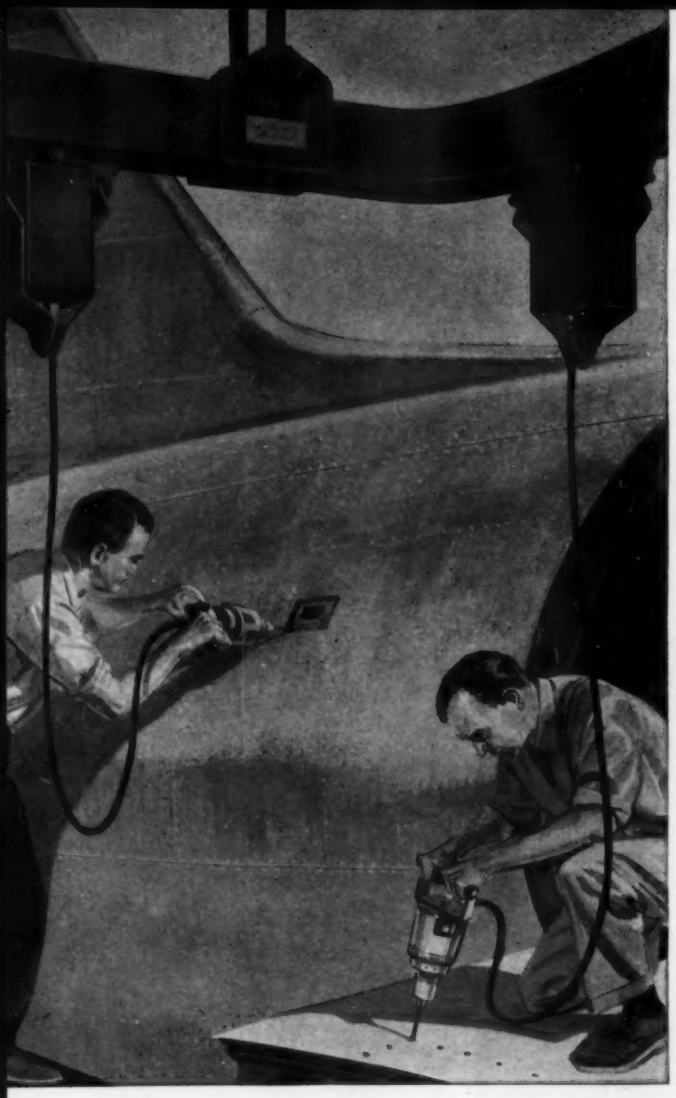
Inside diameter of collar insert can be chosen to fit the different ta sizes

or a hand wrench to hold the tap shank. Either method was not conducive to an accurate tapping job.

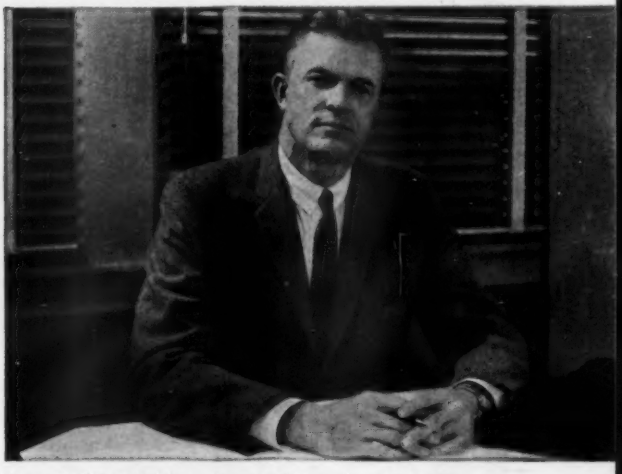
Design of a tool that is adaptable to all sizes of taps, as shown, has improved the operation considerably. With a single housing welded to a shank for insertion into the drill press, adapter inserts are available to fit several sizes of taps in the larger diameter ranges.

Motor-Driven Sanding Belt

SUITABLE for air motor or electric motor drive, a hand sanding device for circular spars is in use at the Philadelphia Naval Shipyard. As described in the Bureau of Ships Journal, the device consists of an offset pneumatic screwdriver (with a free speed of 2000 rpm) and a wooden pulley covered with a rubber deck



Smooth-rolling trolleys tap power from the duct . . . can be added, removed or relocated in minutes without any downtime or rewiring. Duct is rated at 100 and 225 amps. Special curved sections can be ordered to fit any production line.



Your BullDog field engineer will be pleased to give you all the details on Industrial Trol-E-Duct and other BullDog products. Call him. You'll find his know-how very helpful in planning new systems or modernizing existing systems.

Roll power to the job . . . save production time and dollars!

Can your present electrical system actually contribute to higher production? Here's one that can—BullDog Industrial Trol-E-Duct®! It brings *mobile* power to your assembly lines . . . gives you electrical flexibility that saves time, increases output. Looks to your future, too. When you want to add new production units, just insert a new trolley . . . and forget about rewiring and downtime.

Industrial Trol-E-Duct is but one of many BullDog engineering advances that help solve your power problems. A complete BullDog distribution system, from safety switch to Unit Substation, increases safety and efficiency, saves production time and dollars. Consult your BullDog field engineer now about your electrical system.

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IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S

BULLDOG

ELECTRIC PRODUCTS COMPANY

A DIVISION OF I-T-E CIRCUIT BREAKER COMPANY

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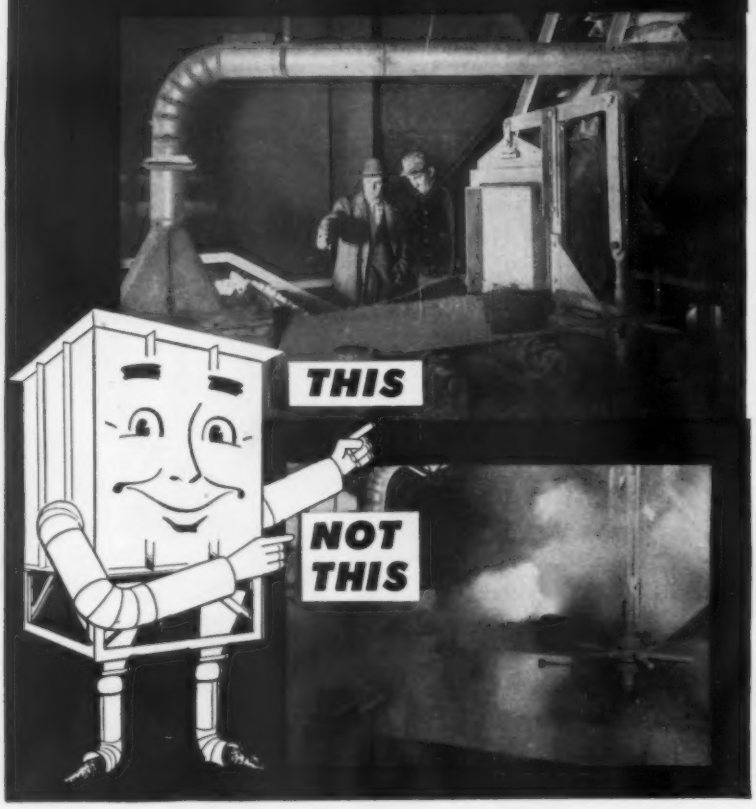
Dust Cutting Down Machinery Life?



You need Pangborn DUST Control in your plant!

Uncontrolled dust in your plant is a costly, needless expense. Dust wears away delicate machinery and clogs working parts, increases down-time and repair costs.

Pangborn Dust Control stops that. Pangborn Collectors trap dust at the source, clean so thoroughly that in the winter many firms cut heating costs by recirculating the already-heated, cleaned air.

In addition, Pangborn gives you the bonus benefits of lower housekeeping costs, more efficient employees, better employee and community relations and extra profits from any salvage value. Complete line of collectors for all jobs.

Discover how *you* can profit from Pangborn Dust Control—write for Bulletin 922, PANGBORN CORP., 3200 Pangborn Blvd., Hagerstown, Md.

11 D

Pangborn CONTROLS DUST

For more facts circle 546 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 56)

Endless sanding belt is pulled around spar with a pneumatic screwdriver

covering. This covering provides traction for an endless sanding belt that is 27½ in. long and 4 in. wide.

The belt travels back or ahead on the spar as the driving unit is tipped to the left or right. The sander can be used on any round object, metal or wood, that has to be smoothed or cleaned.

At the Shipyard, use of the sander, developed by Joseph W. Liener, is replacing the former practice of providing a grip on each end of a strip of sandpaper, for manually pulling the sandpaper back and forth around the spar until the surface was smooth.

Building Gets Steam Bath

To GIVE their buildings a "new look," V. Arena & Sons, Inc., makers of Conte Luna macaroni products, used steam cleaners on the exterior of their

Workmen use steam guns to clean exterior brick walls before tuckpointing

OPERATION—PRODUCTION

(O and P begins on page 56)

office and plant, then tuckpointed the bricks. They found that steam cleaners, used ordinarily to clean interior walls, machinery, kettles and retorts, can be used on building exteriors as high as ten stories, when the volume of steam is adequate.

The units, made by Turbo Machine Co., cleaned approximately 300 sq ft of wall surface per day, with high-pressure steam being applied to the building surface by a long gun applicators equipped with flat nozzles.

Stronger Crane Bridges

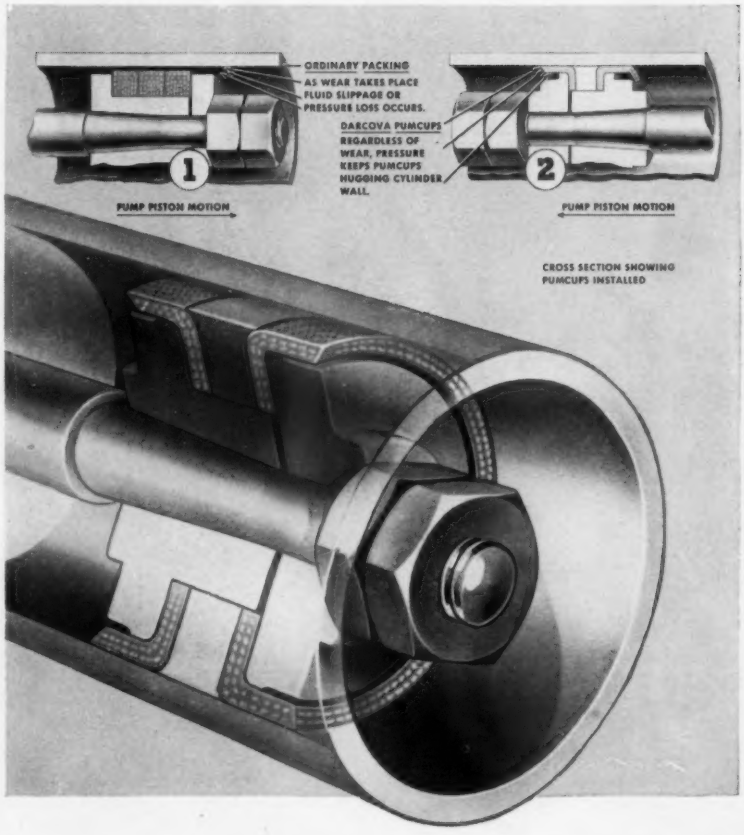
GREATER STRENGTH and greater speed in fabrication of large traveling crane bridges are being achieved at the

Welded studs are used to secure rails on bridge girders of traveling cranes

Alliance Machine Co., Alliance, Ohio, through use of large diameter end welded studs, instead of bolts.

The studs are used by the company to secure rails on the top of cover plates of crane bridge girders. Their use eliminates the need for drilling holes for bolts and thus removes the possibility of weakening the girders.

According to the company, the time required for fastening the rails has been considerably reduced, thus effecting substantial savings in fabrication costs. It uses from 60 to 175 granular flux-filled studs of ⅝-in. and ¾-in. diam on each crane it builds. Studs are made by Nelson Stud Welding Div., Gregory Industries, Inc., Lorain, Ohio.



DARCOVA PUMCUPS mean EFFICIENCY to cost-minded engineers!

IN air and hydraulic cylinders and reciprocating pumps Darcova Pumcups actually retain full efficiency *throughout* their life span . . . and they outlast most other packings at least 3 to 1!

Special texture engineering plus the Darcova Pumcup principle makes it possible for Pumcups to hold their peak volumetric efficiency. Moreover, Pumcups permit equipment to be operated at reduced speeds, save power, prolong equipment life and eliminate the need for frequent replacement shutdowns.

For less maintenance and lower operating costs find out more about Darcova Pumcups. Write for Bulletin No. 4502 on Pumcups for air or hydraulic mechanisms, Bulletin No. 4401 on Pumcups for reciprocating pumps.

DARLING VALVE & MANUFACTURING CO.
Williamsport 14, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
PUMCUPS

For more facts circle 547 on Reply Card

Moisture-laden hot-spot calls for some cool figuring!

Superior design of Louis Allis electric motors pays off under severe heat-humidity conditions

This paddle-agitator drive gets a steady bath of searing hot vapors from the trough below. Yet, the Louis Allis motor has given continuous and reliable service. Here are the special design techniques that make this possible:

Special attention to insulation—Louis Allis sponsors continuous research into new insulating materials. One example: Louis Allis engineers were first to combine Gilsonite with phenolics and alkyds. The result is a varnish with the highest degree of moisture, acid, and alkali resistance — extra-long life for all motor uses whatever your design problem.

Special care in manufacturing—Quality control of all materials . . . careful inspection . . . rigid test . . . all of these add up to the highest quality standards in the industry to assure you of continuous fine performance, dependability under any condition.

These and other Louis Allis extras—such as locked bearings for longer wear, positive lead identification for easier maintenance, and dynamically balanced rotor for quieter operation — could be the answer to your special design problems.

The complete story is in our Bulletin 1700. May we send it to you? Contact your nearby Louis Allis District Office or write The Louis Allis Company, 434 East Stewart Street, Milwaukee 1, Wisconsin.

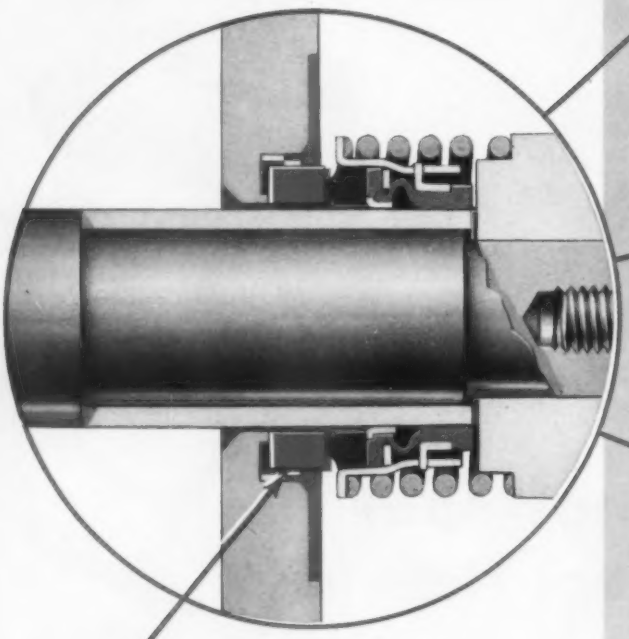
LOUIS ALLIS

MANUFACTURER OF ELECTRIC MOTORS AND ADJUSTABLE-SPEED DRIVES

For more facts circle 548 on Reply Card

A great line of pumps
all equipped with the

B&G TROUBLE-PROOF SEAL ASSEMBLY



Leak-Proof "Remite" Mechanical Seal

This exclusive B & G feature eliminates the customary leakage which occurs where a packing gland is used. A Carbon Seal Ring faces on a "Remite" floating seat—*a new type of material, so hard it will scratch glass—wear-proof and corrosion-resistant.* Metal parts are of steel, bronze or stainless steel, depending upon the type of service. The B & G Mechanical Seal is self-lubricating.

B & G Series 1510-B
Capacities to 1100 GPM,
heads to 420 ft.

B & G Series 1531-B
Capacities to 1500 GPM,
heads to 420 ft.

B & G Series 1522
Capacities to 150 GPM
heads to 115 ft.

Take just a moment to examine the design features of B & G Centrifugal Pumps. You'll find plenty of reasons why these pumps are giving trouble-proof performance through long years of service.

Vertical split-case construction permits removal of the bearing bracket without disconnecting pipe lines or motor leads. Solid cast iron volutes—with support feet in the larger units—effectively prevent transmission of piping strains to the motor.

The shafts of B & G Centrifugal Pumps are an outstanding feature. Made of special alloy steel, they are super-finished and oversized to keep deflection at a minimum. The "Remite" Mechanical Seal— a B & G development—positively prevents leakage...and impellers are soundly designed to maintain hydraulic balance. An oil lubrication system, instead of grease cups, assures continuous protection to the long bronze bearings of these pumps.

B & G Centrifugal Pumps are available as all-iron, bronze-fitted, all-bronze and stainless steel units and in capacities which adapt them to a wide range of industrial applications.

Send for complete data on these three outstanding centrifugal pumps

BELL & GOSSETT
COMPANY
Dept. ET-53, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, W. Toronto

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new help for you!
Gulf Petro-engineering Service
. . . now available to all users
of petroleum products
GULF

Proper engine tune-up procedures mean maximum fuel economy in fleet operations. Gulf Sales Engineers work closely with fleet maintenance superintendents to help save fuel, lengthen periods between overhauls, and increase availability of equipment.

Gulf Petro

brings you practical involving the use of

Gulf Sales Engineers can provide practical assistance to paper mill operators on any process or problem that involves petroleum products.

If you are engaged in manufacturing, mining or quarrying . . . construction or transportation . . . communication or public utility service—you can profit from Gulf Petro-engineering Service.

All of these fields use petroleum products. Many problems arise in connection with their use—problems of proper selection, of storage, of dispensing, of application schedules. And, most important of all, problems of equipment performance!

Very few companies, however, find it practical to hire or train qualified people to perform this specialized engineering job. Gulf offers you its own trained staff to assist you with these problems.

Gulf Petro-engineering Service puts a petroleum specialist in your plant or other base of operations to give you impartial, expert advice on any problem in any way related to the uses of petroleum products.

You can get Gulf Petro-engineering Service if you are

A Gulf Petro-engineering Service specialist can help you select the most suitable cutting fluid for each machining operation. Chances are he will find practical ways to improve production, increase tool life and lower costs.

-engineering Service

help on every problem and process petroleum products

a user of petroleum products—whether or not you have been buying those products from Gulf.

There is no charge for this service.

In essence, here's what Gulf Petro-engineering Service offers you . . .

1. Expert help with any immediate problem involving use of *any* petroleum product.
2. Practical help on any long-range problem, including those which may involve new uses or new types of petroleum products.
3. A survey of your entire operation. Aim: to help you achieve greater efficiency and economy in the use of fuels, lubricants, cutting oils, rust preventives and process oils.

Gulf has a large group of trained and experienced sales engineers ready to serve you. The typical Gulf Sales Engineer who contacts you is a graduate engineer. He has been well-schooled in the formulation and uses of petroleum products. He has the versatility and invaluable knowledge that comes through many years of practical field experience.

If yours is a highly involved or difficult problem, he can enlist the help of another specialist—a Gulf Product Application Engineer.

Behind Gulf field representatives are more than 1,300 scientists, engineers, metallurgists and chemists at Gulf laboratories specializing in the manufacture and application of petroleum products. Their knowledge, coupled with the experience of field engineers, adds up to a broader, better service than has ever been offered before to industrial and commercial users of petroleum products.

Take advantage of Gulf's Petro-engineering Service now. Use the coupon on the next page to send for booklet describing the complete service—or write or call your nearest Gulf office.

Gulf Petro-engineering Service

can be put to work for you immediately on any or all of these problems. It can help you . . .

- Plan the installation of more efficient fuel and lubricant storage and dispensing facilities.
- Get maximum fuel economy through proper engine tune-up procedures.
- Obtain maximum heat or power from each gallon of fuel oil through more efficient combustion.
- Establish proper oil change periods.
- Cut maintenance costs through improved application of lubricants.
- Select rust preventives according to the exact kinds of protection you need.
- Eliminate or reduce oil vapors, sludge deposits and corrosion of fuel oil storage tanks.
- Reduce the number and variety of lubricants used.
- Establish proper flushing procedures for both old and new equipment.
- Control dust on plant grounds and parking lots.

If you are faced with any of these common problems—or with any problems involving petroleum products in use—simply call your nearest Gulf District Office.

GULF OIL CORPORATION
Gulf Building, Pittsburgh 30, Pa.

☐ Send free Gulf Petro-engineering Service booklet.
☐ Have a Gulf Sales Engineer call.

Name_____ Title_____

Company_____

Street_____

City_____ Zone_____ State_____

GULF

GULF OIL CORPORATION
Pittsburgh 30, Pa.

SP-8934

Another NEW BLACKHAWK aluminum "1-bite bender!"

NOW! Make 90° bends in 1¼" through 3" pipe in one pass

It's another Blackhawk exclusive! No other bender on the market can match the performance of Blackhawk's featherweight S-139 ALUMINUM Bender. It's a super-portable 103 lbs. ready for work! Makes 90° bends in ½" to 3" pipe *in one pass!* Only 3 quick settings needed for 3½" and 4" bends.

User's records prove Blackhawks with electric-powered hydraulic pumps pay for themselves in only 35 bends — save up to 75% on cost of manufactured bends.

Get a truly modern "featherweight" from the complete line of preferred Blackhawk Benders . . . for ½" — 2" thin-wall conduit and 1" — 4" rigid conduit and pipe — at your electrical or industrial supply house.

New 3" and 4" featherweight benders

FOR BENDING UP TO 3" PIPE
S-139 assortment with electric-powered hydraulic pump — or S-138 assortment with hydraulic hand pump. Both for 1¼, 1½, 2, 2½, and 3" diameters.

FOR BENDING UP TO 4" PIPE
Model S-140 assortment with electric-powered hydraulic pump. For 1¼, 1½, 2, 2½, 3, 3½ and 4" diameters.

FOR BENDING UP TO 4" PIPE
S-137 assortment with P-85 hydraulic hand pump . . . for 1¼, 1½, 2, 2½, 3, 3½ and 4" diameters.

Exclusive work-saving BLACKHAWK features

REMOVABLE TOP PLATE..."LOCK-ON" SHOES — No threading of shoes on ram — simply place them in position and insert lock pin. Pipe is quickly positioned from above rather than "muscled-in" from side. Top-plate has snap-action, quick-lock bolt.

"OPTIK-ANGLE" GAUGE — Stops guesswork and time-wasting measuring in controlling degree of bend. The exact angle of bend is constantly in view. Gauge is mounted right on bender.

WHOPPING 77% SAVED ON BENDS! Dietz Electric Co. project foreman says, "on our last job we saved more than $2,000.00 compared to cost of manufactured ells. Blackhawk S-139 will be our production bender from now on."

Aluminum Alloy Frame and Shoes . . . Strength with Light Weight!

Rigid and Strong — yet surprisingly light weight — means greater portability, easier assembly on bench, floor, makes overhead bending a cinch. Smooth action S-139 turns out uniform factory-like bends — makes big savings in time and materials compared to manufactured bends.
The new Blackhawk is by far the easiest to use . . . fastest bender on the market today. Keeps electrician crews happy too!

CALL YOUR ELECTRICAL OR INDUSTRIAL SUPPLY HOUSE TODAY!

BLACKHAWK bends prove BLACKHAWK'S best!

BLACKHAWK

BLACKHAWK MFG. CO., DEPT. P-4947, MILWAUKEE 46, WISCONSIN

"Porta-Power"

Hydraulic Pipe Benders

Hydraulic Knock-Out Punches

Hydraulic Jacks thru 100-tons

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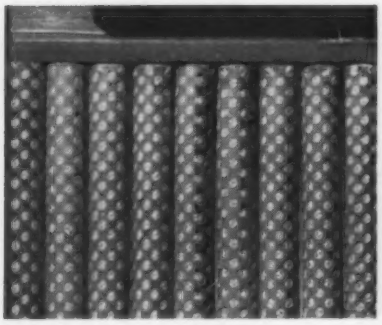
Get more work from your

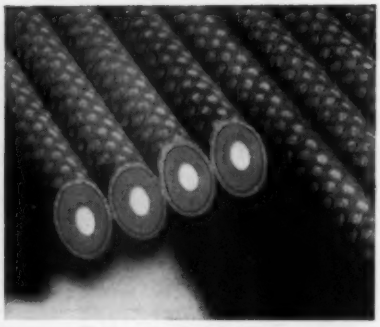
NEW TG EXIDE-

NEW POSITIVE AND NEGATIVE PLATES – DEVELOPED



New tubular construction of positive plate! Armored porous tubing. Provides resistance to corrosion and effects of vibration, improved flexibility, and maximum retention of active material. Thousands of tiny openings mean...

Greater porosity. Highly permeable tubes ease current flow, reduce internal resistance, improve access of electrolyte. Battery will deliver more power to meet sudden heavy loads. Tubes hold . . .



More active material. Chief source of battery power. Larger inside diameter of tubes means every positive plate contains more active material per cubic inch of plate. And for maximum capacity and long life, there's a . . .

electric industrial trucks

IRONCLAD BATTERY

Want more work hours—no increase in battery size? You get 44% more capacity in the new TG Exide-Ironclad Battery. For example, you can replace a 500 ah battery with a 720—in the same size. This means your trucks can do more work. They can earn a great deal more on your investment in them.

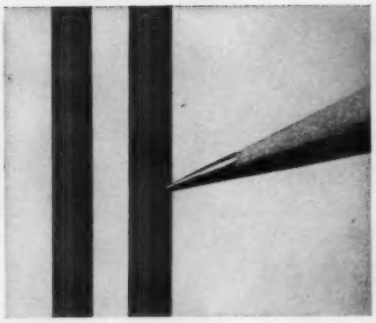
Satisfied with the work capacity of your present battery? Then get it at the lowest cost to own and operate—and get the newest, most advanced electric industrial truck on the market today.

Packs 44% more power into same battery space . . . priced to give you even greater battery economy

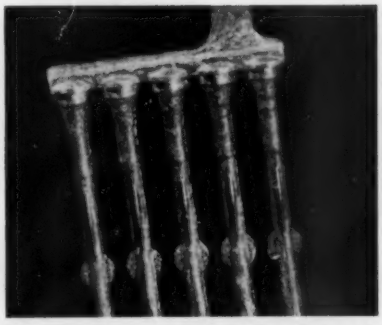
Want even lower operating cost and improved performance from your electric industrial trucks? Here Exide makes it possible. The new TG Exide-Ironclad Battery combines challenging new materials with an ingenious overall new design to produce the highest capacity per cubic inch of any battery available today. It's the most dramatic increase in capacity and the biggest step forward in power per dollar in history. This new battery can benefit every user of electric industrial trucks.

Learn more about the operating and expense advantages. Call your nearby regional Exide representative. Or write for complete information. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 1, Pa.

OUT OF RESEARCH STARTED 15 YEARS AGO



Thicker negative plate. Specially designed to match the increased capacity of the new positive plates. Plate is both thicker and stronger and possesses better electrical characteristics. You get all these advantages . . .



Plus Silvium,* Exide's exclusive grid alloy—proved more corrosion resistant than other leading grid alloys. Silvium is a patented combination of metals designed to prolong battery life. **U.S. patent*

Exide®

The Electric Storage Battery Company

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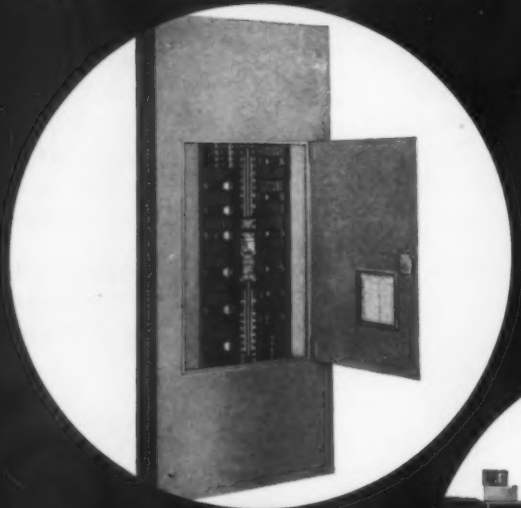
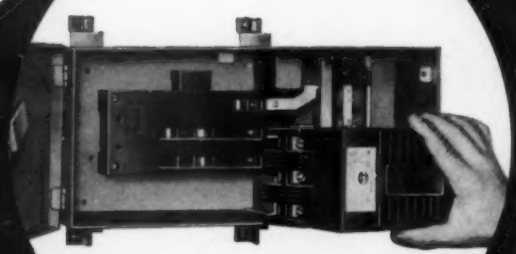
NOW! Simplify your electrical maintenance problems with...

AB-I's

STABREAKER



PANELBOARDS



BUS DUCT PLUG-INS

STABREAKER'S PLUS FEATURES

AB-I's With STABREAKER you simply "plug-in" all ratings from 15 to 225 amperes in only two general purpose StAB-Inclosures, providing unheard of flexibility and convenience...greatly simplified installation...visual certainty of breaker disconnect...simple interchange of ratings.

PANELBOARDS Now make top-notch lighting and power distribution panelboard installations in a fraction of the time—get the breakers and enclosures from distributors' stock. Meet all requirements up to 600 amp. mains, 225 amp. branches with the same STABREAKERS and only 4 enclosures. And—you meet changing service requirements in a matter of minutes; simply pull out the breaker in question..."plug-in" a new one with the rating you need and the job's done.

BUS DUCT PLUG-INS All the "plug-in" advantages inherent in STABREAKER AB-I's have also been applied to Bus Duct "plug-in" disconnects. The same flexibility and convenience combine to simplify your Bus Duct plug-in requirements from 15 to 100 amps. And of course, you're always in position to change ratings quickly and easily. Simply pull out the old breaker—plug-in breaker with new rating and that's all there is to it.

the only AB breaker that can be used 3 ways!

Now Federal Pacific consolidates virtually all of your AB circuit breaker needs into one design...STABREAKER!

By adding "stabs" to its regular line of type AB molded case circuit breakers...Federal Pacific makes it possible to use the same STABREAKER interchangeably in (1) individually enclosed circuit breakers (2) or in lighting and power distribution panelboards (3) or in bus duct plug-in devices.

Offering you flexibility never before possible, STABREAKER simplifies your circuit breaker inventory, simplifies installation, provides the greatest latitude in changing ratings and even systems (from single phase to 3-phase) without disturbing the original installation.

IMMEDIATE STABREAKER AVAILABILITY—over 330 distributors across the country and a network of Federal Pacific warehouses combine to assure an immediate supply of STABREAKERS and enclosures whenever you need them.

Finest Products Engineered

FEDERAL PACIFIC ELECTRIC

COMPANY

Main Office: 50 Paris Street, Newark 1, N. J.

Plants at Newark, N. J.; Long Island City, N. Y.; Cleveland, Ohio; St. Louis, Mo.; Dallas County, Texas; Scranton, Pa.; Los Angeles, Calif.; San Francisco, Calif.; Santa Clara, Calif.; Emeryville, Calif.; Affiliated Plant, Toronto, Canada.

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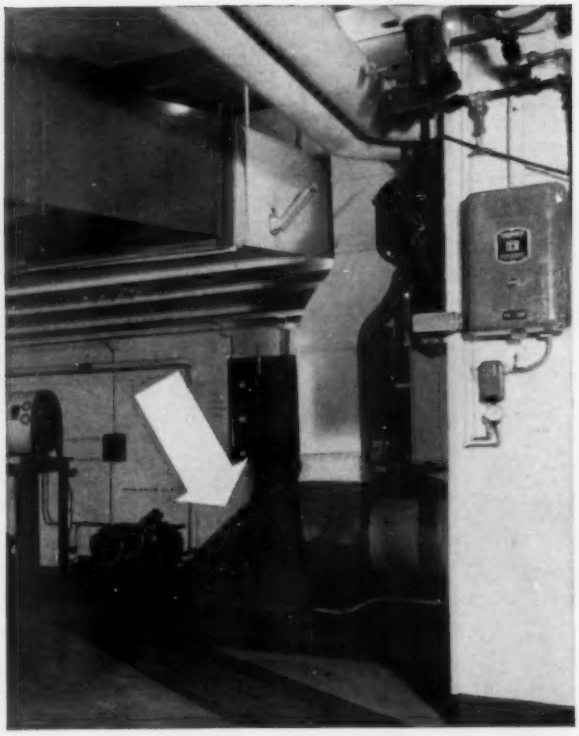
FROM TELEPHONE BOOTHS . . . TO INDUSTRIAL PLANTS



. . . here's the most versatile package unit that ever solved a ventilating problem!

American Blower Utility Set

We call them utility sets because they handle such a wide variety of ventilating problems.

Self-contained, American Blower Utility Sets, in a wide range of sizes and capacities, are used to supply or exhaust air in a wide variety of applications requiring a duct system. That means from small-capacity driers, laboratory exhaust systems, to the supply and exhaust requirements in hard-to-reach areas of public buildings, apartments, schools, hospitals, or industrial plants.

As individual package units, they are easy to install, economical to operate. And they're engineered by American Blower—specialists in the design and manufacture of air-handling and air-conditioning equipment for over 75 years. So why not call your electrical contractor or supplier today for full information; or write: American Blower Division of American-Standard, Detroit 32, Mich. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-Standard

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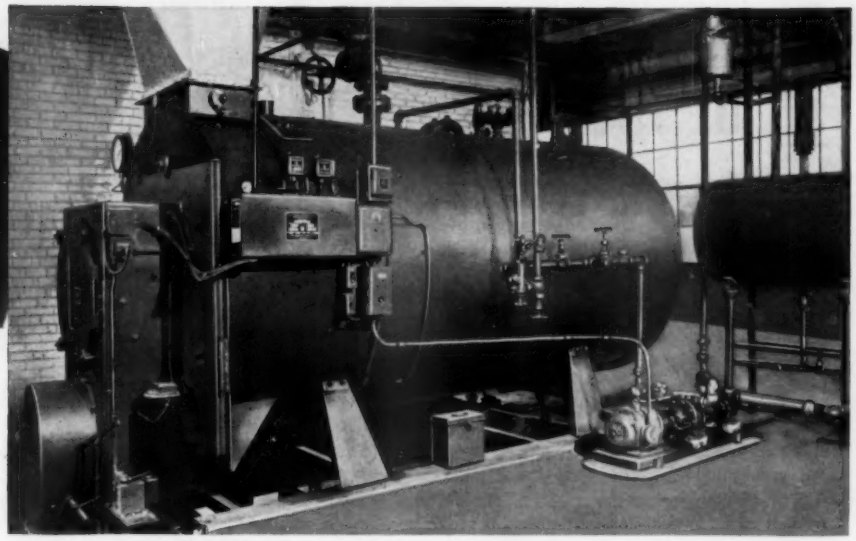
"As an engineer, I know the advantages of SIMPLIFIED OPERATION in Packaged Boilers"



New 150-HP gas-fired Continental Automatic Boiler, installed in Progress Laundry, Dallas, Texas, reducing gas consumption more than one-third. Continental Boiler Distributor: J. P. Philibert, Fort Worth, Texas. Installation by H. C. Lohman Machinery Co., Dallas, Texas.

Six Reasons Why it Pays to Buy a CONTINENTAL Automatic Boiler

* Guaranteed 80% efficiency . . . Fire-tested before shipment . . . Range, 20 to 500 hp.
* Simple, practical two-pass design, for uniform flow of combustion gases through all return tubes.
* Maximum radiant heat transfer achieved by "Spinning Gas" technique for thorough mixing of air and atomized fuel.
* High-CO_2 and low-temperature stack gases — proof of high combustion efficiency.
* Free, rapid water circulation improves heat transfer, keeps heating surfaces clean.
* Easy access to furnace and all return tubes. Refractory baffles and brickwork are not required.

"In designing or modernizing a boiler plant, simplicity of equipment usually means important savings in both labor and fuel. That's just another way of saying it pays to insist on Packaged Boilers.

"Controls are simplified and dependable, and they require practically no maintenance. Cleaning is simplified by easy access to burner and tubes. Air atomizing reduces burner maintenance to a minimum.

"Best of all, the responsibility for this simplified operation rests with one firm only — the manufacturer of the unit. So if we ever do need help, we know exactly where to get it."

For details on the Continental Automatic Boiler, send for Bulletin BE-3

BOILER ENGINEERING & SUPPLY COMPANY, INC.

2 Manavon Street, Phoenixville, Pa.

A HALF CENTURY OF BOILER MANUFACTURING EXPERIENCE

The Continental AUTOMATIC BOILER

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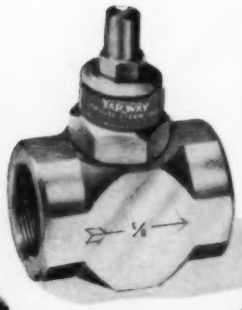
½" No. 60 or 120

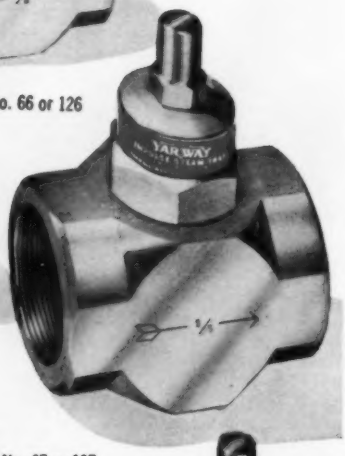
¾" No. 61 or 121

1" No. 63 or 123



1½" No. 66 or 126

1¼" No. 64 or 124



2" No. 67 or 127

all of these steam traps are impulse!

Take your choice! There is a Yarway Impulse Steam Trap for practically every trapping requirement in your plant.

Revolutionary when introduced 20 years ago, the *Yarway Impulse* principle has been proved by more than a million in service everywhere, is still gaining new friends every day.

SERIES 60—for *normal steam trap requirements;* pressures to 400 psi, temperatures to 450° F. Stainless steel body and working parts. Six sizes, ½" to 2".

NO. 20-A—available in ½" size only— similar to ½" #60, but with low capacity—designed especially for *light condensate loads.*

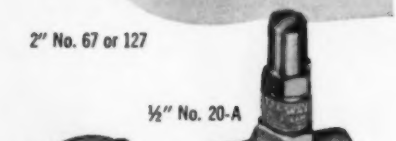
SERIES 120—same as Series 60 but for higher pressures and temperatures (600 psi, 750° F). Featuring all-stainless steel construction. Six sizes, ½" to 2".

SERIES 40—for *heavy condensate loads* requiring high capacity traps. Sizes ½" to ¾" in stock, larger sizes (1½", 2", 2½") available.

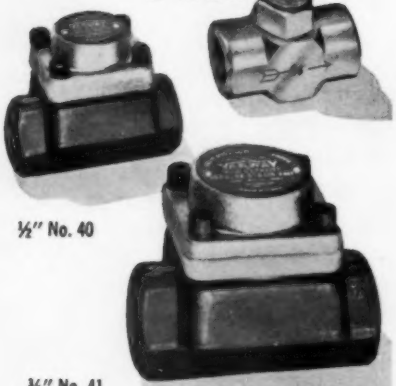
INTEGRAL STRAINER TRAPS—for marine use and for high pressure trapping service in steam power plants with pressures up to 2500 psi. Six sizes, ½" to 2"; flanged and socket-welding ends.

All Yarway Impulse Steam Traps are available through 270 convenient local Industrial Distributors. For descriptive bulletin on any type of Impulse Trap, write . . .

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.

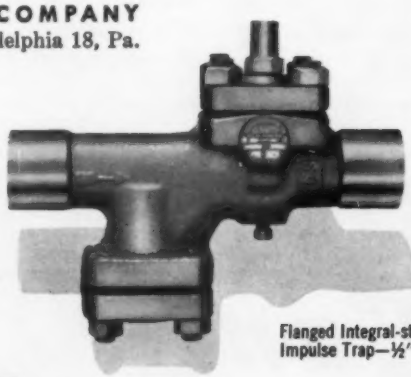


½" No. 20-A

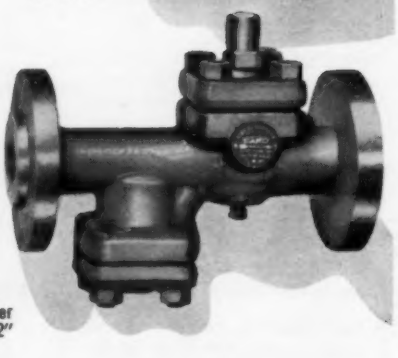


½" No. 40

¾" No. 41



Socket-weld Integral-strainer Impulse Trap—½" to 2"



Flanged Integral-strainer Impulse Trap—½" to 2"

YARWAY IMPULSE STEAM TRAPS

The Impulse that revolutionized steam trapping 20 years ago

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by B. A. Wasil, Structural Engineer

STRUCTURAL DESIGN OF AN INDUSTRIAL BUILDING PART I

THIS BRIEF is the first of a series that will carry through the complete structural design of a small industrial building of the mill building type. It will consist of a structural steel frame with corrugated asbestos roofing and siding. A rotproof roof will be provided with the use of a leveling material, asbestos felt, a roof insulator, asphalt and a three-ply asbestos built-up roof. It is assumed that a roof pitch of 1:12 will suffice. A depth of approximately 1/12th of the span, or four feet, will be used for the ends of the roof truss and to provide the pitch, the depth will increase to six feet at the center. See Fig. 1.

Recommended span for corrugated asbestos roofing is four feet, six inches; therefore, purlins will be spaced at a maximum of this dimension (4 ft, 6 in.). The purlin spacing will be made the panel points of the truss in order to prevent bending in the top chord. This will also provide for a well laid-out truss. In order to provide nearly equal spaces between purlins, a spacing of four feet will be used. A Pratt truss will be designed for the application.

With corrugated asbestos sheeting, a spacing of five feet, six inches is recommended. The cross-sectional layout for the building is shown in Fig. 4. It should be noted that the end trusses are supported at the ⅓ points and are subjected to lighter loads than are the interior trusses. There may be some savings in steel, should the end trusses be designed for the loads and span of the interior trusses. However, there will be a saving in labor, due to repetition of details, if all the trusses are designed identically. For this reason, an interior truss will be designed and will be used for all six trusses in the building.

A live load of 30 lb per sq ft shall be used for the design of the roof and a wind load of 20 lb per sq ft shall be used in the design of the girts and columns. The provisions of the AISC "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" will be used. The explanatory information in design, which has already been covered in previous Briefs, will not be repeated.

The assumption will be made, to make the design problem more explicit, that the process to be housed in the building is such that it will require the availability of an overhead crane of 10-ton capacity. The hook of the crane shall have a lateral sweep of 36 ft and a longitudinal sweep of 100 ft. The lifting requirements of the crane are to be such that a 20-ft clearance is required from floor to the bottom of the crane bridge. For these reasons, the crane was selected with the space requirements as indicated in Fig. 2.

Design of the building will include the following structural steel items: 1. purlins, 2. truss, 3. truss bracing, 4. crane girder, 5. bracket for crane girder, 6. eave struts, 7. girts, 8. columns, 9. wall bracing and 10. column base plates. Connections will be discussed with each of these structural elements.

Design of Purlins

Comparison should be made with

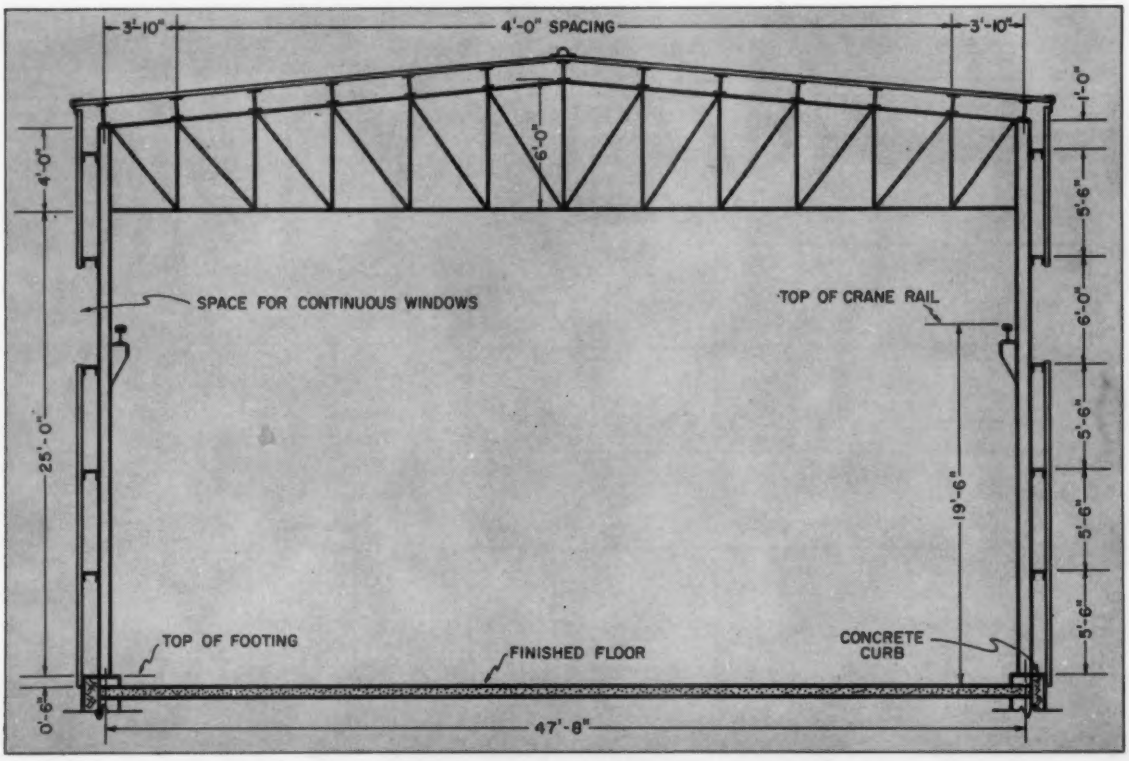

Fig. 1. Detail elevation of the mill type building which will be designed. Truss and wall construction are shown

the design of the purlin in this structure and that of the high-pitch roof in the previous Brief on trussed roof design. Since the roof of this particular building is to be nearly flat, the tangential component of the loads may be neglected.

Assuming the dead load of the corrugated asbestos and roofing material to be 10 lb per sq ft, the total load of the roof will be:

Roofing 10 × 4	=	40 lb/ft
Est. wt. of purlin	=	25 lb/ft
Live load 30 × 4	=	120 lb/ft
Total load	=	185 lb/ft

Maximum moment then equals:

$$M = \frac{185 \times 25^2}{8} = 14{,}470 \text{ ft-lb}$$

Assume the use of a 10I25.4 beam

Then, $\frac{1d}{bt} = \frac{25 \times 12 \times 10}{4.66 \times 0.491} = 1310$

Allowable compressive stress,

$$f_a = \frac{12{,}000{,}000}{1310}$$

$f_a = 9170$ psi

Section Modulus required =

$$\frac{14{,}470 \times 12}{9170} = 18.9 \text{ cu in.}$$

Section modulus provided by a 10I25.4 beam = 24.4, therefore the beam selected is adequate for the load. Provide connections as shown in Fig. 3.

This Brief, part 1 of a series on this subject, will be referred to in subsequent Briefs. If possible, it should be filed for reference. For additional copies, write the editors.

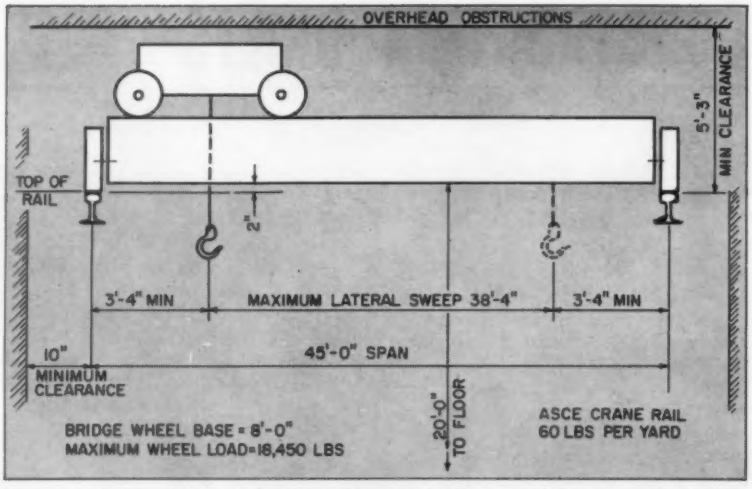

Fig. 2. Configuration and location of crane to be provided for in the design

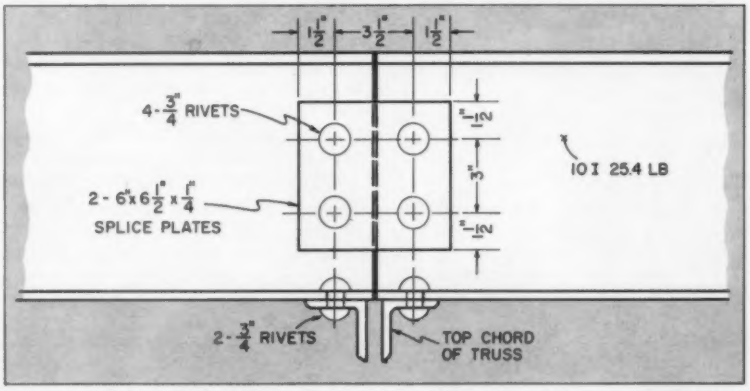

Fig. 3. Drawing shows detail of the splice plates in main beam construction

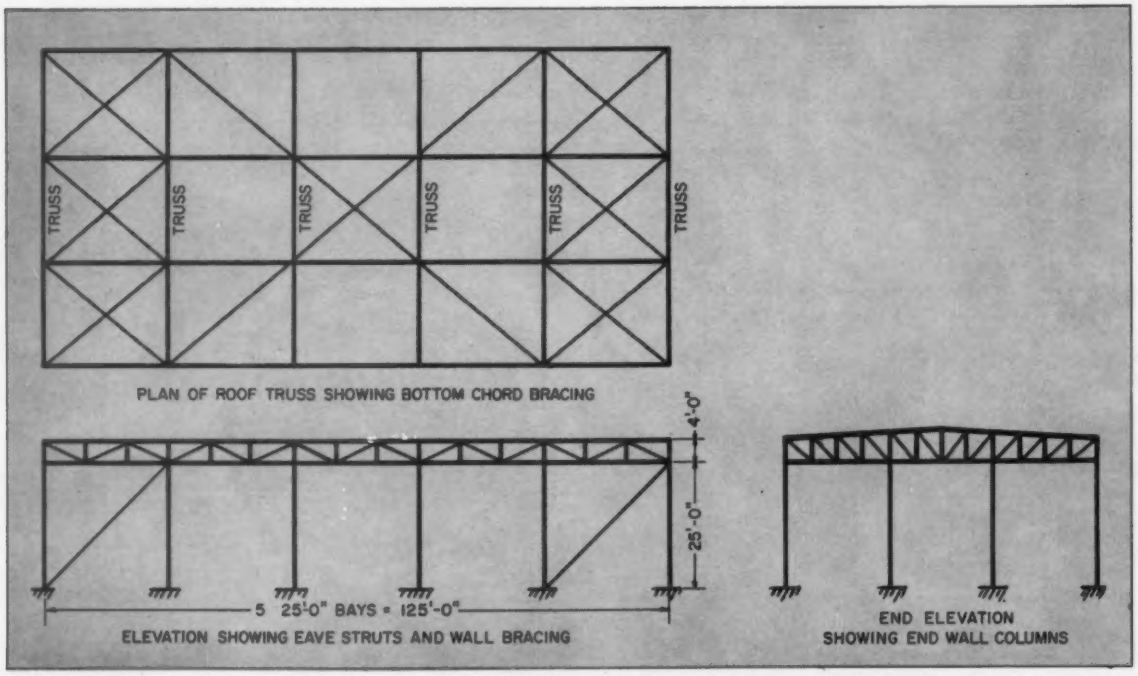

Fig. 4. The plan and elevation drawings of the building to show struts in trusses, bracing in bottom chord and walls

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A Division of The B. F. Goodrich Company
Department TW-632, Akron 18, Ohio

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D. L. ALEXANDRE
Vice President
EAST NEWARK REALTY CORP.

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"Naturally, uninterrupted operation and maintenance costs are of considerable interest to us. With the OTIS factory and local office only minutes away we have no concern about emergency service. However, we have found that OTIS 'engineered service,' which replaces all wearing parts before failure, keeps our elevators operating at their original efficiency without interruption.

"From a maintenance standpoint, we know exactly what our monthly cost will be. It's a fixed charge that's adjusted annually on labor and material costs only and never because of the age or condition of the equipment. With 11 freight elevators in operation it's nice to know that we can't suddenly be confronted with a stack of costly repair bills."

maintenance that keeps freight elevators running like new

- ☑ **Guarantee of the maker's high standards of safety through the constant checking and replacing of parts in advance of their breakdown point.**
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Baker Trucks, too, are designed with maintenance in mind. This 4,000-pound gas truck has at least 12 maintenance features.

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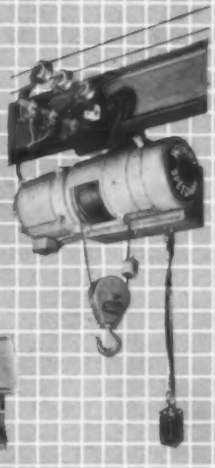
WRIGHT Electric Hoists

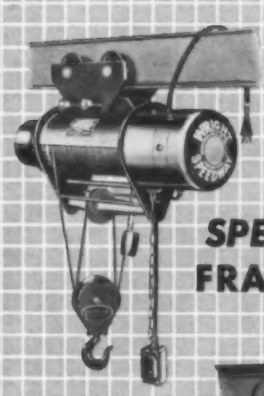
NEW ELECTRIC CHAIN HOIST

The new WRIGHT Electric Chain Hoist is available in two size capacities: 300 to 2000 lbs. (single chain) and 3000 to 4000 lbs. (double chain). It is safe, easy to operate, rugged and durable. It is exceptionally valuable for use on production lines, over machine tools or any shop location where space is at a premium.



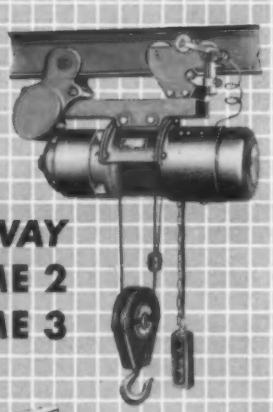
2-SPEED SPEEDWAY FRAME 1

WRIGHT now offers a *Speedway* Two-Speed Hoist in the Frame 1 size. It permits precise, gentle positioning of production work in capacities from ¼ ton to 1 ton. This hoist gives a fast lifting and lowering speed —and a slow speed (¼ the rate of the fast speed) by the use of 1800/450 RPM motors.



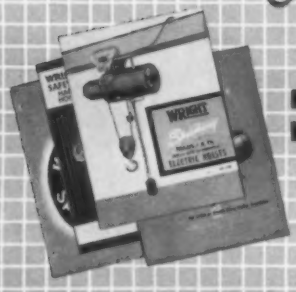
SPEEDWAY FRAME 1½

WRIGHT *Speedway* Electric Hoists are built to meet the many and varied demands of modern high-speed production. Many design improvements minimize maintenance costs and down-time. The Frame 1½ Hoist will handle loads of from 1½ to 2 tons. The Type L-1½ shown is 4-part reeved and intended for relatively slow lifting speeds.



SPEEDWAY FRAME 2 FRAME 3

WRIGHT Frame 2 *Speedway* Electric Hoists are capable of handling loads from 1½ to 6 tons. The Frame 3—from 1½ to 10 tons. WRIGHT *Speedway* Hoists are available with single or variable speeds and with a wide variety of mounting arrangements to meet specific requirements.



FOR COMPLETE INFORMATION

Ask for the following booklets for complete information on WRIGHT Hoists and Crane components: Speedway Hoists (Frame 1-1½) Booklet DH-133B, (Frame 2 and 3) Catalog E-55B • Motor Driven Cranes—Underhung, Single Bridge—Bulletin #227; Top Running Cranes—Bulletin DH-448 or DH-449 • Crane Drive Units—Booklet DH-431A • Hand Traveling Cranes—Bulletins DH-468 and DH-348B.

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THESE FEATURES MAKE WRIGHT *SPEEDWAY* HOISTS YOUR BEST BUY FOR—

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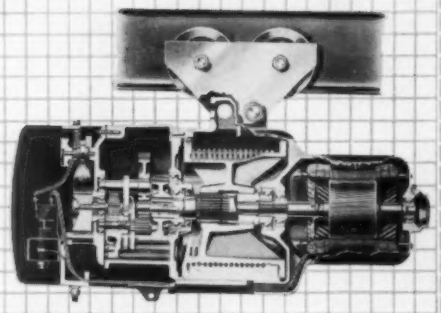
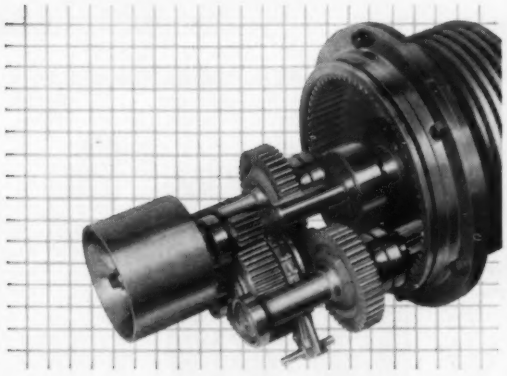
Fine balance and heavy duty design makes possible the continuous handling of tough jobs on any duty cycle for which a 30-minute NEMA motor is satisfactory. All gears and pinions are alloy steel, heat-treated. Their ductile core supplies shock resistance to the most severe service stresses. Anti-friction bearings are used throughout.





LONGER LIFE

Strength of gear teeth of WRIGHT Frame 2 and Frame 3 SPEEDWAY Hoists has been doubled by a change in contour and grain structure of the metal. Internal gear ring and heavy flanged cross section is bolted to the drum at six points and provides extreme resistance to distortion.

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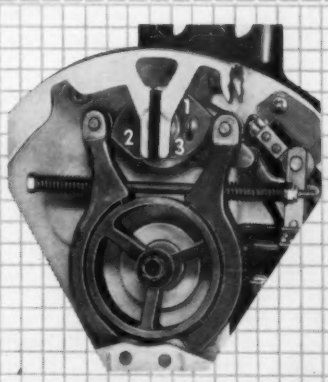
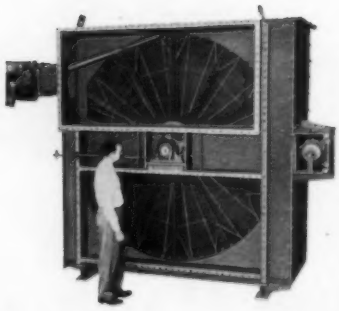
There is nothing to adjust but the cam to keep the brake in perfect adjustment. When excessive load drift occurs...just remove the screw shown at Position **1**, swing the cam until Position **2** is in line, and replace the screw. Position **3** is provided for the final third of brake lining wear. Brake springs and solenoid never need adjustment.



Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO



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Call Graybar *first* on any problem of lighting . . . particularly Group Relamping. We can give you or your electrical contractor important information on Group Relamping programs. Graybar trained lighting experts can give you impartial recommendations on the lamps and lighting equipment best suited to your needs. Graybar will deliver ten thousand different types of uniform, dependable G-E lamps in any available size or color, in any quantity —anywhere in the United States. Through Graybar you have available the most complete selection of lamps and lighting equipment available from any source.

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For complete information, see your Hallowell distributor. Or write Hallowell Shop Equipment Division, STANDARD PRESSED STEEL CO., Jenkintown 26, Pa.

*Patent applied for

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Brand	Time to Assemble (Min.)	Units Per Hour
Erectomatic	10.24	5.75
A	13.23	4.53
B	14.24	4.21
C	16.30	3.68
D	18.12	3.31
E	25.03	2.40
F	55.03	1.09

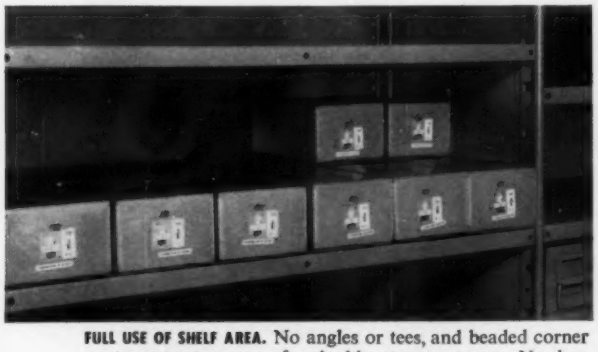
FAST ASSEMBLY. Just position the shelf supports, insert the shelf, and press the unique locking device. No tools or special instructions necessary.

gives you all these extra-value features

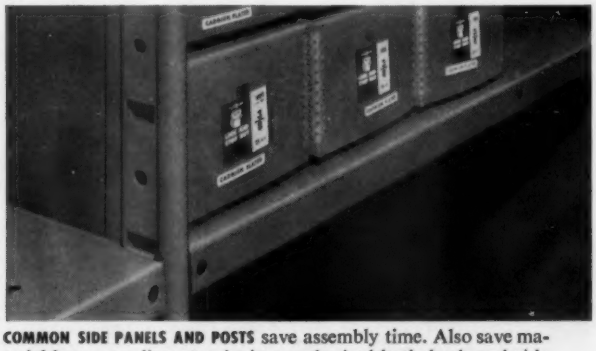
QUICK SHELF CHANGE. Just release the locks, remove the shelf and its supports, relocate the shelf, and press the locks. It takes only seconds.

STRAIGHT-IN, STRAIGHT-OUT SHELF CHANGE. No tilting to interfere with any other shelf. No time wasted unloading shelves or removing bin fronts, partial dividers, label holders.

INDEPENDENT SHELF POSITIONING. Each shelf is an independent unit. Can be removed and repositioned without disturbing any other part. All shelves in a rack can be aligned.

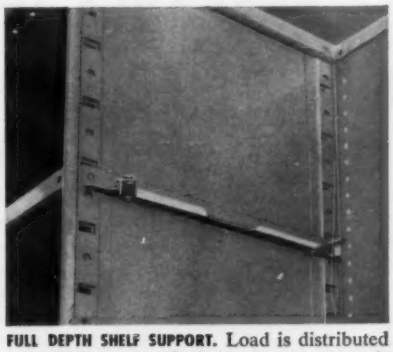


FULL USE OF SHELF AREA. No angles or tees, and beaded corner posts prevent waste of valuable storage space. No box guides are needed.

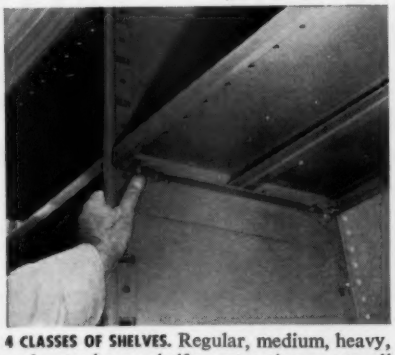


COMMON SIDE PANELS AND POSTS save assembly time. Also save material between adjacent units in a rack. And both back and side panels are one-piece.

BEADED POSTS AND FLANGED SHELVES prevent snagging of clothing or stored goods. Also prevent injuries from sharp, ragged edges.



FULL DEPTH SHELF SUPPORT. Load is distributed over full depth of shelf. No buckling is possible. Reinforcements can be added when they are required.



4 CLASSES OF SHELVES. Regular, medium, heavy, and extra-heavy shelf construction meets all load requirements. Made to government specifications. Extra-heavy shelf shown.

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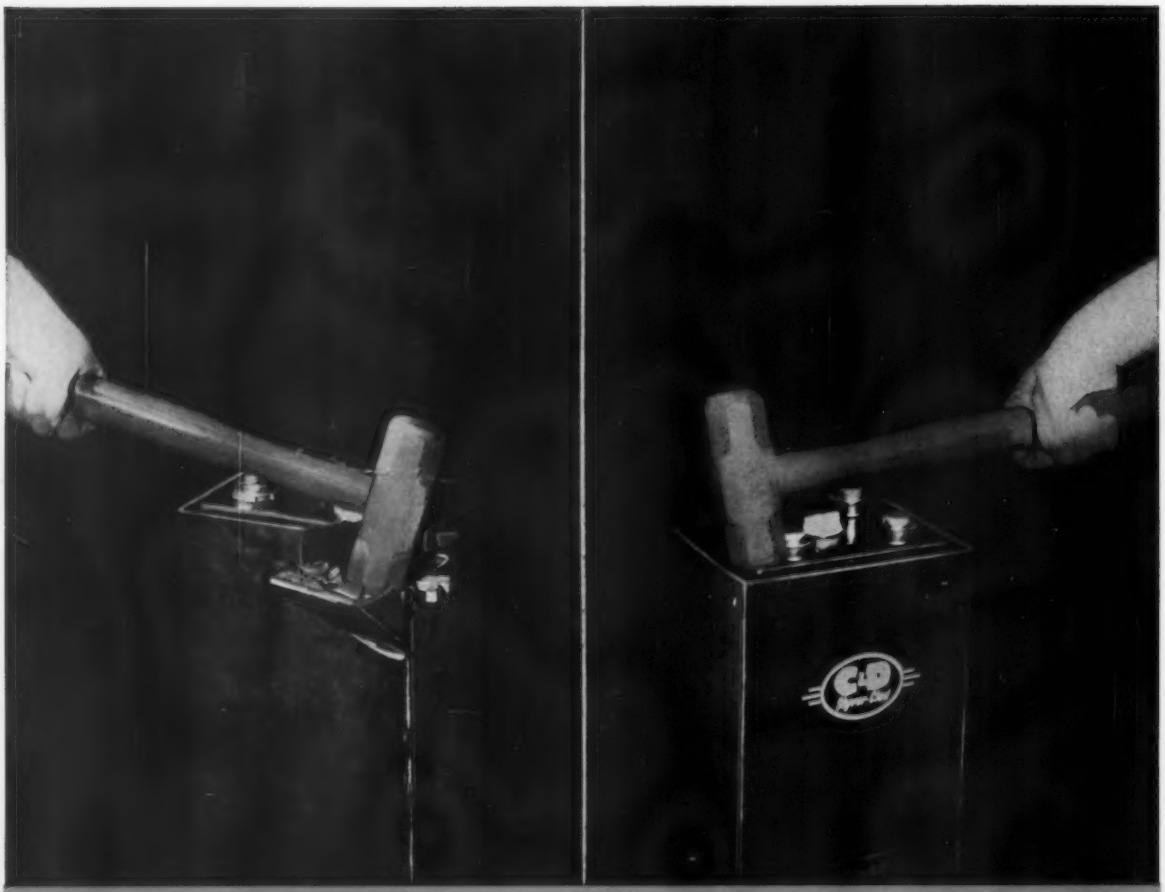

See the difference! The battery cell on the left with a container and cover made of present standard materials has been struck with a four-pound maul. Notice the smashing and cracking. C & D's Slyver-Clad cell, with the container and cover made of new, exclusive C & D *Hi-Impac* compound was struck the same way—without a sign of breakage! Imagine the damage to truck batteries prevented, and the resulting time and money saved on repairs with batteries made of C & D's new *Hi-Impac* material.

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...with new C&D *Hi-Impac* cell cover and container!

New C & D *Hi-Impac* material for cell covers and containers for industrial storage batteries was developed jointly by C & D's research department and those of the major rubber companies. Thoroughly field tested, the *Hi-Impac* material virtually eliminates the danger of cell container and cover damage by dropping, collision between trucks, or from the impact of heavy objects falling on the battery. Thus, C & D *Slyver-Clad*® batteries with the *Hi-Impac* containers and covers practically never have to be shopped for cell replacement or repair due to cracked or broken containers and covers.

All sizes of C & D's famous, Five-Fold *Slyver-Clad* batteries are now made with exclusive *Hi-Impac* material. Now with C & D batteries you not only get extra-capacity in a standard size tray; you also get *Hi-Impac* cell covers and containers that virtually eliminate breakage. It's one more reason why—

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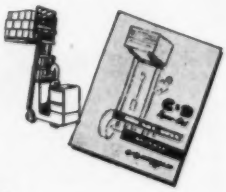
For details and specifications on C & D *Slyver-Clad* batteries with *Hi-Impac* cell covers and containers for electric industrial trucks and motorized lift trucks, write for Bulletins IT-524/56 and IT-525/56.



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BATTERIES, INC.

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SINCE 1906

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What's Just Ahead in This Issue?

HOW MANY benefits can a plant get from its sound and PA system? Leeds and Northrup, in its new North Wales, Pa., plant squeezed every bit of value from its well-engineered system. It gets full and effective control of the system for all emergencies; instant communication with all plant locations; quick location of all roving personnel; background music to maintain production and to relieve monotony and fatigue. To read about the "Five-In-One Communications System" see page 116.

HOW DO YOU persuade employees to share-the-ride and thus prevent out-of-plant traffic jams and overcrowded parking lots? Convair's applied psychology turned the trick without adding one square foot of parking area (they didn't have it to add, anyhow). Now, traffic, parking and tempers have improved with just a few simple changes. The article: "Psychology Plus Privileges Plus One Fence Equals Solution" may give you an idea or two. See Page 96.

ARE PERISHABLE tool losses wrinkling your brow? If they aren't you're a fortunate plant engineer. Not many plants *spend* as much as 1½ million dollars on tools in a single year. That's what Douglas *saved* in one year. Nevertheless, the common sense that was applied to end these staggering losses can be applied in any plant. If you are having trouble with waste, pilferage and sloppy handling of tools read the article, "Tool Costs Down 1½ Million Annually." It starts on page 104.

NOT ONE dividend, not two dividends, but three dividends are derived from this plant's plating waste recovery system. In addition to recovering plating metals and acids as well as solving the problem of discharging undesirable wastes into public water-courses, this manufacturer is able to recover practically all the water used for plating rinses. The recovered water supplies from 20 to 40 per cent of the total boiler house requirements. The cost of the waste treatment is almost at the break-even point, thanks to recovering quantities of plating metals and acids and reusing the water. See page 120.

ARE YOU TIRED of wild goose chasing? Do you wear out a lot of shoe leather looking for causes of equipment troubles in the plant? How would you like to nail down operating faults right from your swivel chair? One such system is doing patrol work in a new Henry Ford clinic in Detroit. It can detect troubles in as many as 90 different locations of the multi-storied building. See page 114.

STEP-BY-STEP, addition after addition, this midwestern plant kept increasing in size. Eventually these growing pains focused attention on the expansion of power facilities. Voltage drop had to be corrected and provisions had to be made for future growth. This led to discussions on substations and plant primary power transmission. Method of running the 4160-v cable was a big problem. Refer to page 100 to see what was decided.

Safety and Savings—How Industrial TV

HORIZONS FOR closed circuit television are no more limited than those of electronics itself. It is extending man's eyes and man's arms into places where it is dangerous and sometimes impossible for man himself to be. Two more examples of the manner in which ITV (industrial television) is serving industry are shown on this page. In one case it is saving one company $10,000 of hard-earned cash. In the second case it may someday save a man's life.

For the safety angle first: Closed circuit television is now being used by Esso Research and Engineering Company as a pilot plant safety aid at the firm's Bayway, N. J., facilities.

Hazardous atmospheres in the propane de-asphalting pilot unit make it desirable for a shift foreman located in a nearby building to observe the area so that emergency measures may be taken if trouble develops or an operator falls ill.

A wide angle television camera, made by General Precision Laboratory, is enclosed in a protective housing and mounted to survey the critical area. The continuous picture of the workmen on the job, transmitted by coaxial cable to the TV screen in the foreman's office 300 ft away, permits immediate action if required. A similar picture appears on another receiver installed in the shift inspector's office.

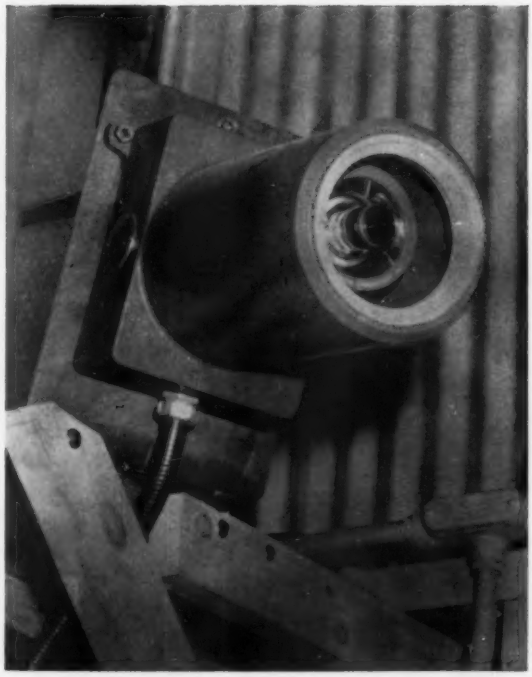


Fig. 1. TV lens surveys critical area in Esso pilot plant

Save $10,000 Annually

By using a closed circuit television system another industrial firm estimates it saves $850 each month in lowered electric power bills. This company, a manufacturer of zinc oxide products, is billed on the usual demand rate basis. Their particular contract called for establishment of the demand rate even though the peak for the month was reached but for a moment.

If the manufacturer was able to monitor the demand meter he would be able to control power consumption by switching electric furnaces so that peak power demands could be avoided. Since the power company did not permit tapping onto the demand meter for remote indication this particular method of monitoring was impossible.

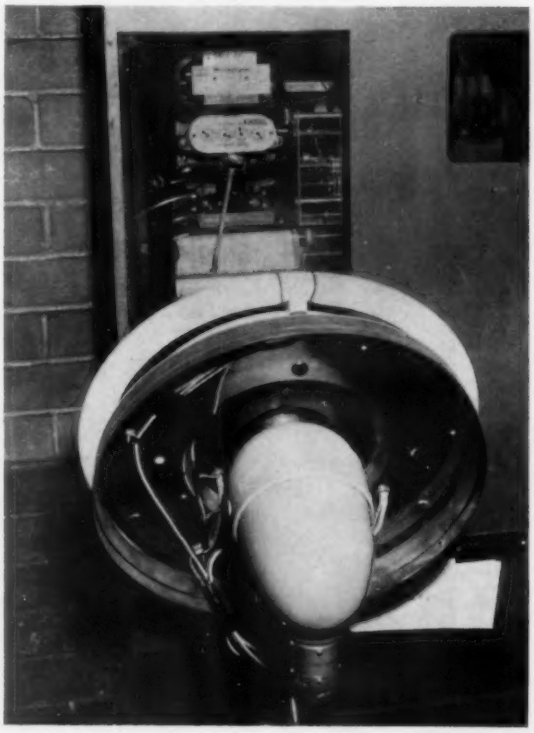
It would have been possible, of course, to place a man in the company's substation for monitoring. However, the cost of doing this would have been far more than the projected savings would permit.

Company engineers finally decided to place a small 5-lb television camera, also a General Precision Laboratory unit, in the substation to furnish a close-up view of the meter. A circular neon tube was mounted on the camera to provide excellent light for the picture.

Some 500 ft away, in the plant control room, it was possible for the man in charge to monitor the meter readings and make the necessary load adjustments to keep the demand under certain predetermined heights.

Now the company, with an investment of only $4000 in an industrial television system, enjoys a savings of over $10,000 annually.

Fig. 3. Lighted TV camera views power demand meter



Proves Its Worth on Two More Jobs

Fig. 2. Shift foreman at Esso Research and Engineering Co. pilot plant checks safety of workmen at unit 300 ft distant

Fig. 4. Engineer watches picture of demand meter, located 500 ft away, on television monitor installed in plant control room

This was the big jam, before streets from parking areas were made one-way, before more police were added at shiftbreak

Convair's Formula for Parking and Traffic Control:

Psychology + Privileges + One Fence = Solution

49,000,000 . . . that's a figure no plant engineer can ignore.

That many cars ply U. S. highways . . . jam our new suburban areas . . . stand bumper-to-bumper outside our plants.

If your plant hews to averages, you can figure *one* car to every *two* employees . . . more, if yours is a suburban operation.

"Traffic control," once an almost wholly in-plant function, now has both new meaning and significance. Today, it's likely to mean how you cope with plant parking; how your parking lots are assigned and laid out; how traffic is routed to and from your parking facilities.

In a word: like it or not, the plant engineer has turned industrial traffic engineer . . . with emphasis on parking lots, access roads, traffic control.

Nor is it merely a plant's "personal" problem. More and more, plant engineers are coming (by necessity) to equate their own traffic problems with local traffic . . . how *their* auto population affects nearby traffic. How, for instance, a thousand cars streaming out of your jam-packed lot can snarl nearby highways, block feeder roads, jeopardize or inconvenience motorists who are unwary enough to get caught in your plant jam.

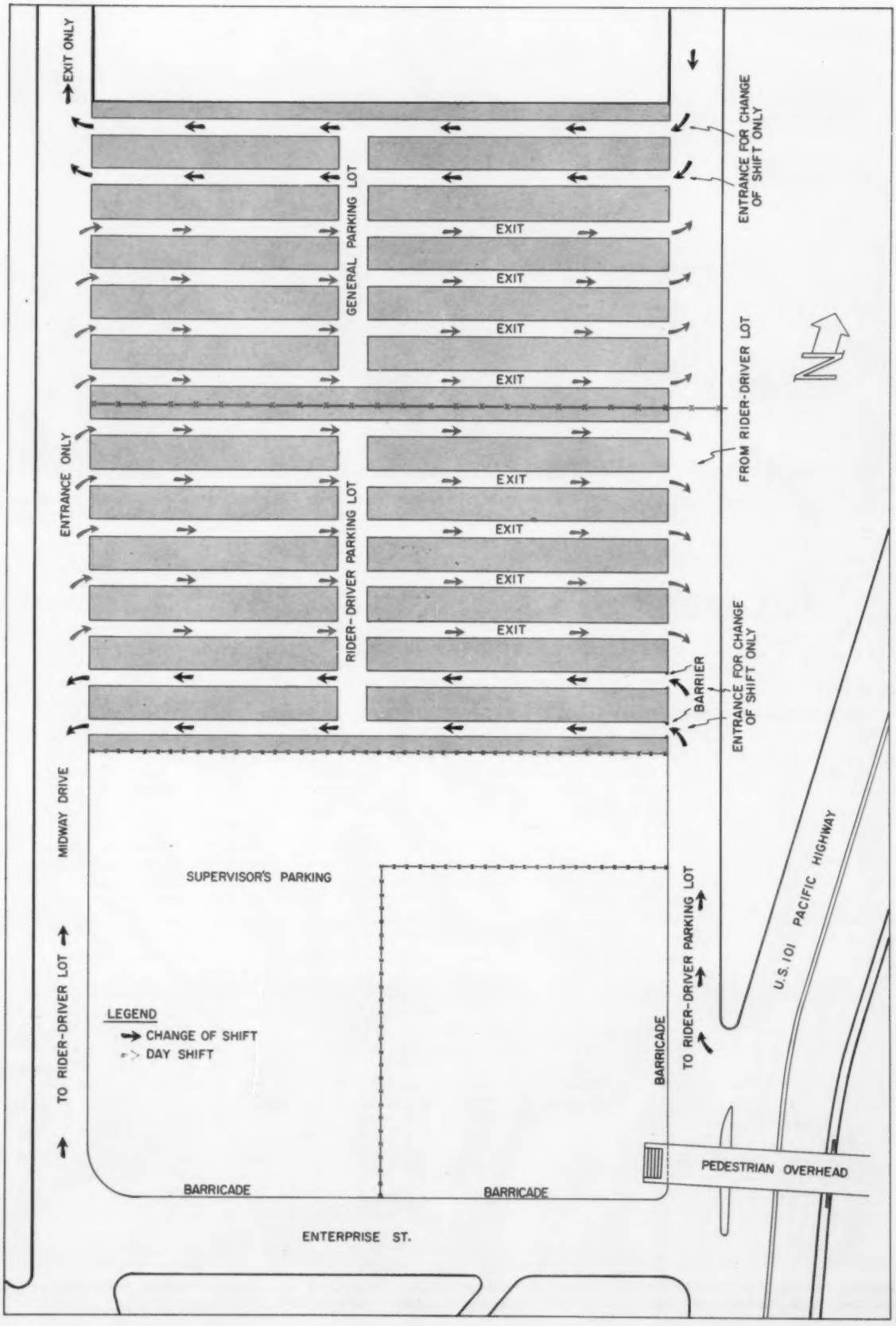
And, if like Convair's Plant II in San Diego, your employment is spiraling upwards, your problems are compounded.

Convair, unlike some other plants, not only unsnarled its jam but became a good industrial neighbor in the process. Yet it accomplished the job without assigning an extra square foot to parking. This, even though Plant II employment now stands at 14,000, fully 8000 of these working the day shift—and even though its lots were designed originally to handle parking for about half that number.

Convair's parking . . . its solution . . . and how the plant considered it a civic and industrial duty to unsnarl the jam . . . bears close study by plant engineers the country over.

Briefly, the plant had what amounted to three parking lots. Its supervisors' lot (restricted to departmental heads) had capacity for some 500 cars. Its general lot could handle another 2600 cars. That's total capacity of 3100

Drawing on opposite page shows new exit and entrance lanes in color arrows and swingshift traffic flow in black arrows. Heavy color line down middle of drawing represents the fence between rider-driver and the general lot


EXIT ONLY
GENERAL PARKING LOT
EXIT
EXIT
EXIT
EXIT
ENTRANCE FOR CHANGE OF SHIFT ONLY
FROM RIDER-DRIVER LOT
ENTRANCE ONLY
RIDER-DRIVER PARKING LOT
EXIT
EXIT
EXIT
EXIT
BARRIER
ENTRANCE FOR CHANGE OF SHIFT ONLY
MIDWAY DRIVE
SUPERVISOR'S PARKING
U.S. 101 PACIFIC HIGHWAY
TO RIDER-DRIVER LOT
LEGEND
CHANGE OF SHIFT
DAY SHIFT
BARRICADE
TO RIDER-DRIVER PARKING LOT
PEDESTRIAN OVERHEAD
BARRICADE
BARRICADE
ENTERPRISE ST.

stalls. Additionally, there was a rather distant, inconvenient overflow lot, its capacity a few hundred cars.

Convair put Plant II into aircraft production about a year ago, the plant having been sold right after the war to private interests. When Convair rehabilitated the facility, it found itself with parking for a maximum 3500 cars with 8000 workers on the dayshift. And, figuring a car for every two employees, that meant 4000 cars, but only 3500 stalls. Worse, there simply was no room either for more lots or for more cars. Somehow, Convair would have to get by with what lots it had. Parking might be better controlled, and more advantageously allocated, but not expanded.

Although, theoretically, Convair plant engineers could expect 4000 cars to flow toward its lots on the dayshift, the theory had a nasty habit of fooling the statisticians . . . especially on rainy days.

Come inclement weather and as many as 5000 dayshifters eased the family car out of their garages and headed Convair-wards. But even when that 4000-car average held (as in good weather), there was a mad and fender-jolting scramble for what stalls there were. And always, 500 or more drivers either had to squeeze into the overflow lot (which itself was often jammed to overflowing), or rent space in near-plant private lots where parking ran $2.00 weekly.

Private Lots No Answer

As a matter of fact, more and more employees were turning to private lots. And, while this might seem a blessing for Convair and its over-all parking problem, actually the private lots (mostly lying beyond Convair's traffic control pattern) compounded the jams. First, private lots encouraged employees to punch out a few minutes early to get to their cars and "beat the rush." Secondly, too many of the private lots fed into Convair's traffic pattern . . . the flow blocking cars streaming out of the Convair lots.

But the biggest bottleneck was the head-on meeting of day and swing shifters. Convair allots 60 minutes between the end of dayshift and the beginning of swing to clear its lots. Theoretically, that hour seemed ample for smooth shift transition.

In practice, dayshifters were still nudging out of Convair's lots at 4 p.m. (Dayshift ended at 3:30 p.m.) just as swingsters started moving in (swing shift commenced at 4:30 p.m.) The two shifts . . . and their 4000-plus cars . . . literally met head-on. One outcome was frayed nerves . . . and fender-scrapings. Another was felt far beyond Convair's immediate plant complex. For the bumper-to-bumper jam blocked San Diego's main inbound freeway (important coastal highway U.S. 101). It clogged feeder streets. And everywhere motorists steered clear of Convair and the freeways at break-time. The jam was so complete that even after a Convair employee had managed to squeeze out of a lot, he might be half an hour moving the half-mile to street or freeway where traffic flow was at least moving, if only at snail's pace.

Cars? Convair will always have them. But with more exits, more police and better lot layout traffic is, at least, manageable and employees are happier

The obvious solution was more, and better, parking. But Convair simply had no more acreage available for parking.

A plant engineering survey revealed that: 1. Far too many employees were "soloing to work . . . were their car's only passenger. 2. Unpaved lots slowed and sometimes impeded traffic come a rain and they'd break-out in a rash of chuck holes). 3. Swing shifters were arriving too early in their eagerness to get a parking stall. 4. Traffic flow could be speeded by better control, more efficient lot layout, more exits-entrances and rerouting of traffic.

First, Convair engineers—with a strong assist from public relations, which publicized the plan in the company paper—put a bonus on "sharing the ride." Plant engineering revamped parking. The *general lot* was cut into two areas. Largest and closest to the plant was assigned as "Rider-Driver" lot. No car could enter unless at least three employees were being carried. If a car wasn't carrying at least three (the driver and two passengers or more), it was shunted to the general lot. This lot was not only smaller, but considerably farther from both the plant and the freeways.

The "Rider-Driver" lot had another advantage: its cars could be assured faster get-away at the shift's end.

Within a matter of days, hundreds of Convair cars which had been arriving with only a driver, showed up with a driver and two riders . . . thus gaining admittance to the preferred lot. Today, at least 30 per cent of Plant II's 8000 dayshifters are rider-drivers. Thus, Convair has succeeded in reducing lot population by some 400-500 cars.

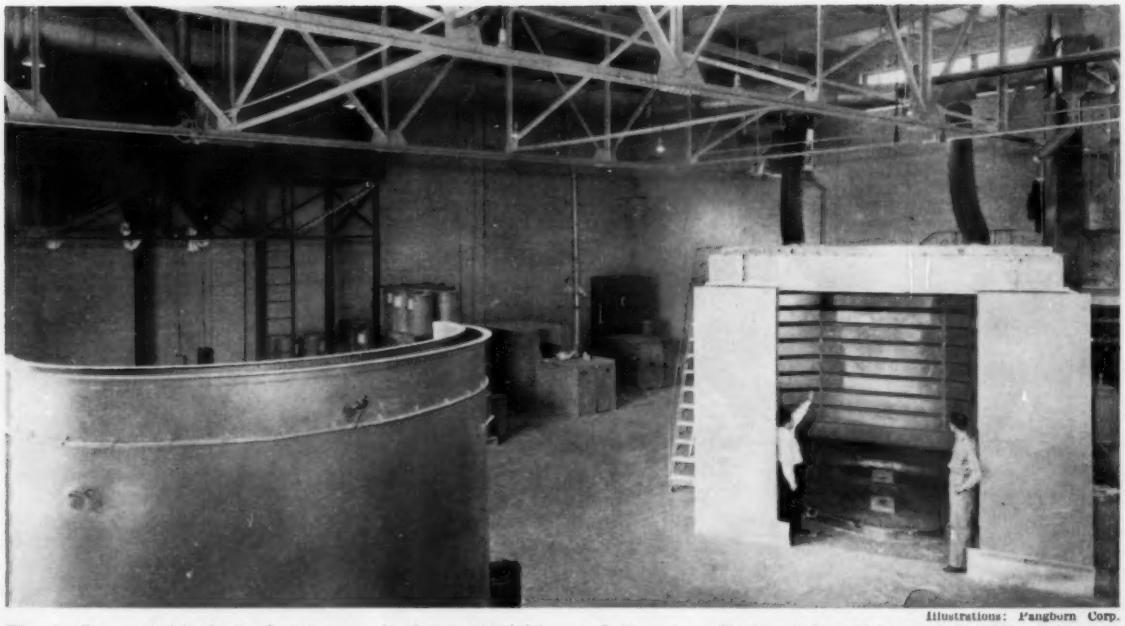
Replacing oiled-earth, Convair is pushing through an asphalt concrete program which will see some 1,028,865 sq ft of parking lot laid with 2 in. of asphalt. Exits are being widened from an average 20 ft to 35, so that two lanes can process through each exit and possibly three. The number of exits are being doubled . . . to as many as eight in the general lot, the same number for the rider-driver lot.

And, because all lots are controlled unidirectionally at shift breaks, some stalls, at least, can be straight-in (90 deg offroad), squeezing ten to twenty per cent more stalls into existing space.

Just as important, swingshifters have been told not to bring their cars to the lots before 3:45 p.m. By then, with existing time for the dayshift now cut in half, lots are clear . . . and ready to accept the swingsters' cars.

Convair's special police force has

(Continued on page 240)



Illustrations: Pangborn Corp.

Fig. 1. Demountable dust-exhaust room is shown at right. Dust-laden air moves through flexible piping to rigid duct and then to collector, left. Water-cooled shell plates are used to process batch during heating and cooling cycle

Dust Control Goes Right to the Job

When Not in Use, Dust Room Can Be Stored To Save Space

BECAUSE OF THE intermittent nature of its dust control requirements, Synthetic Mica Corp., Caldwell Township, N. J., has installed a dust room, Fig. 1, which can be disassembled, folded and stored after use.

The reason the company selected this equipment can best be explained with a brief description of the process. In the production of pure crystals of synthetic mica, the company has to fuse 20 tons of powdered mineral ingredients from the inside out by electrical resistance heating and then cool it very slowly.

After this cycle is finished, the crystalline nugget of synthetic mica inside the unconverted batch is only a fraction of the weight of the 20-ton charge. Thus, the bulk of the material must be removed by chipping and breaking with air tools, and this creates a very high dust loading in the surrounding space.

Usable chunks of synthetic mica taken from the core of the batch are later reduced in a jaw crusher. This would create a further dust problem if the entire unit were not placed in an exhaust enclosure, Fig. 3. The vertical exhaust pipe from the crusher ties into the same dust control system. This can be seen in Fig. 1, center background.

The dust collector in the system has a capacity of 10,000 cfm of air. Dust is separated from the conveying air by cloth filter bags supported on metal frames. The unit is mechanically rapped for five minutes every four hours to cause the dust to fall into the collection hoppers from which it is removed. The collector, upper left in Fig. 1, is set high off the floor to permit storage of raw materials at working level.

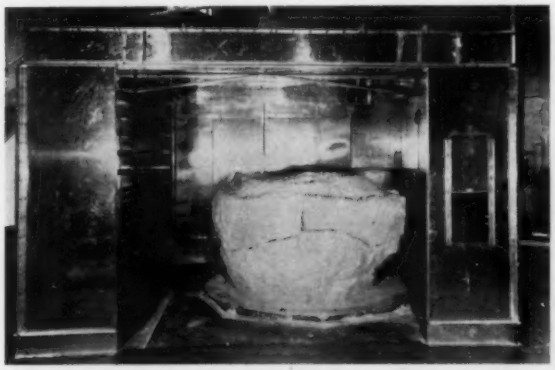
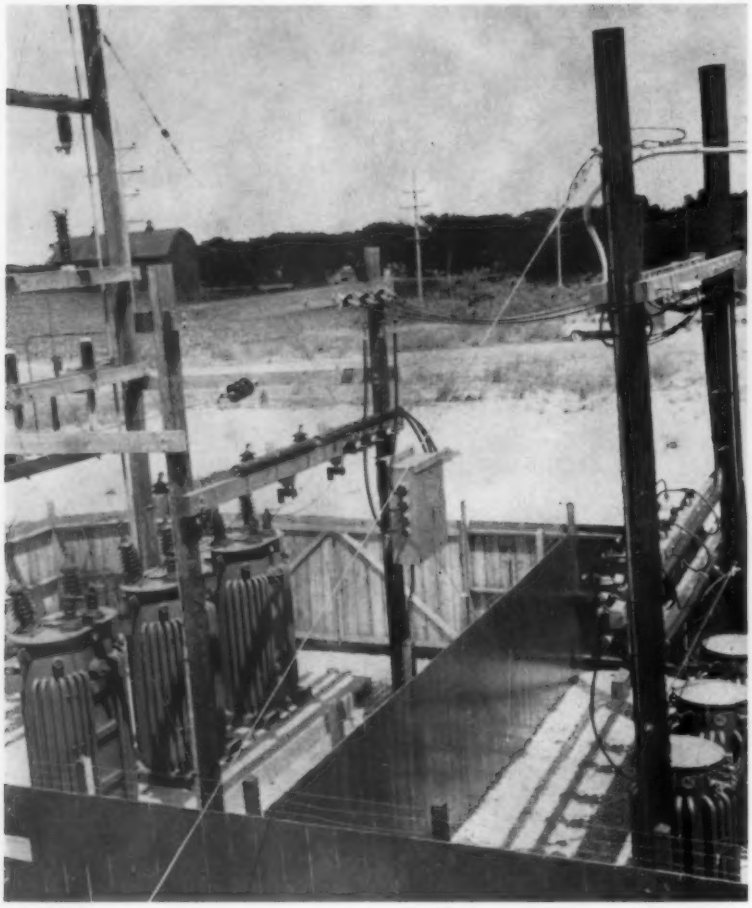


Fig. 2. Close-up of processed charge after heating and cooling cycle; before dust-producing chipping, breaking begins

Fig. 3. Jaw crusher, mechanism and drive unit are totally enclosed. Vertical exhaust pipe ties into dust control system



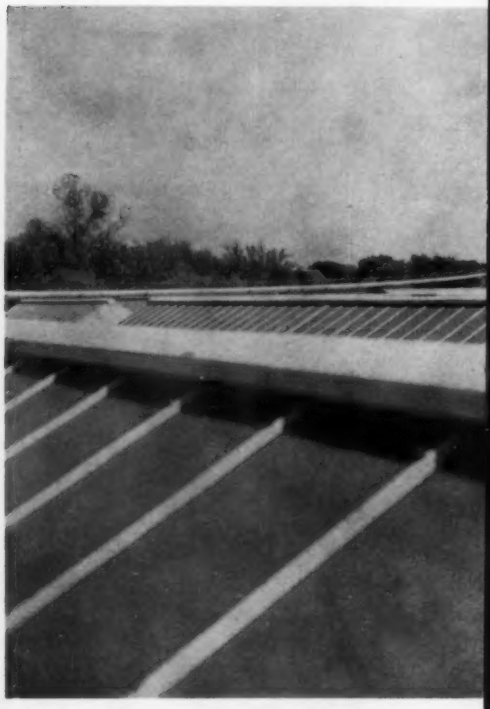


Fig. 1. The utility transformer bank on the left receives 34.5-kv current

Fig. 2. Above: The run of armored cable starts out on the two-pole structure

Plant Primary Power Transmission

Grounded Messenger Helps 4160-V Armored Cable Span Roof

By JOHN R. HAUGAN, Plant Engineer, Union Special Machine Co., Chicago, Ill.

AS OUR PLANT in Huntley, Illinois, grew in size, it became necessary to expand our power facilities as many of our main runs were already as long as 250 ft and over. Voltage drop was, of course, a factor and a general system of distribution at 208 v had to be abandoned.

We, therefore, set out to determine the most economical distribution system and voltage for our primary. Our secondary system was pretty well established at 208 v, three phase 60 cy, since most of our equipment was being transferred from an older plant. This was already wired for 208 v, a-c.

Basically, we needed to provide an expandable plan. It had to be expandable in capacity within the present area and also into new areas for future growth.

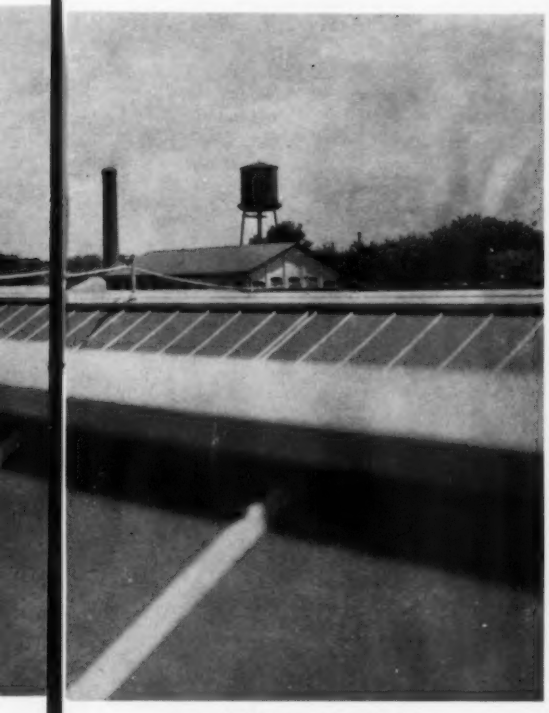
Our first step was to discuss this problem with the power company. They were inclined to supply us power at a plant primary of 4,160 v. This was a considerably higher voltage than that to which we have been accustomed. Outside of special purpose equipment, we use no voltage beyond 440 v.

We, therefore, agreed that our distribution system within the plant would continue to be of a four wire network arrangement. Our 208 v power would be taken from the three phase wires. We further agreed that we would continue the practice of using the top three-phase circuit from each power distribution panel, together with a neutral wire to feed a lighting distribution panel. As a result, all lighting would be at 120 v and would be balanced against all three phases.

Our desire to keep our 208 v feeders under 250 ft in length led us to the conclusion that one or more sub-stations would become necessary for secondary distribution. These would have to be located strategically to take care of our present conditions and provide flexibility for future expansion.

After considering the various types of transformers and their cost, we decided to use outdoor type transformers and to set them on a concrete slab in a fenced area. The idea was to place them in such a manner that one bank and associated equipment used only half of the available slab space. The other half would provide room for future expansion. The slab itself was also larger than necessary so that we could increase the transformer size without changing the pads, structure, and fence enclosure.

Each sub-station has the capacity to



on right hand side of Fig. 1, continues for about 500 ft to similar structure

Fig. 3. It then drops to a wye-wye connected transformer bank on the right

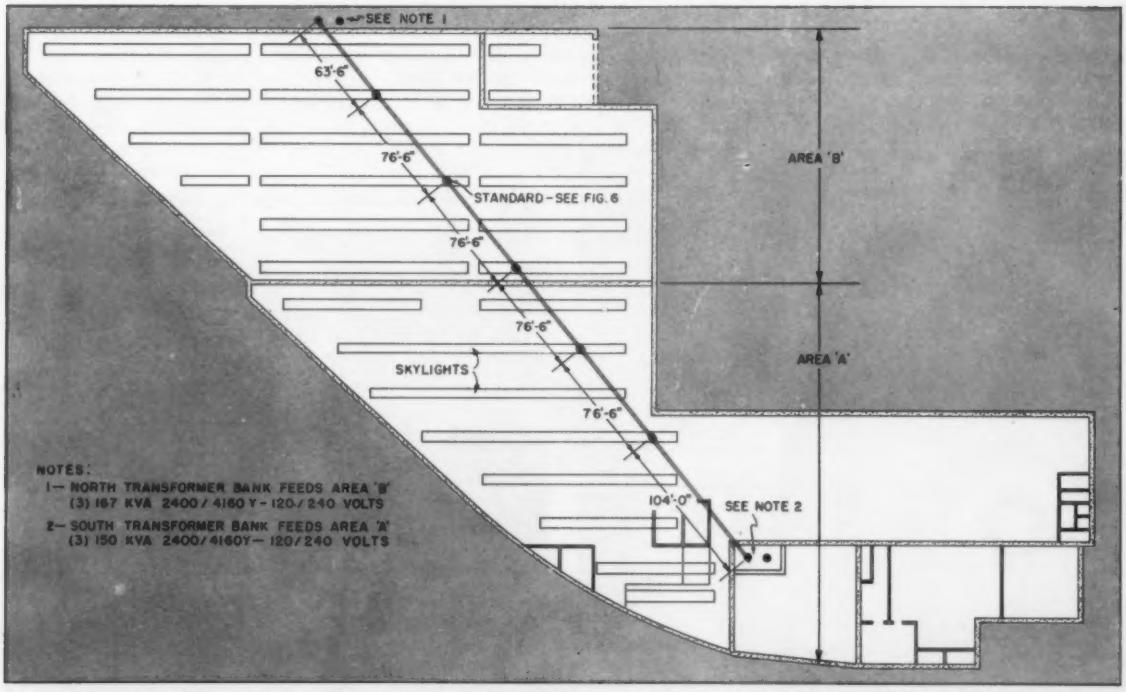


Fig. 4. View showing armored cable run. South transformer bank serves section A; north bank takes care of section B

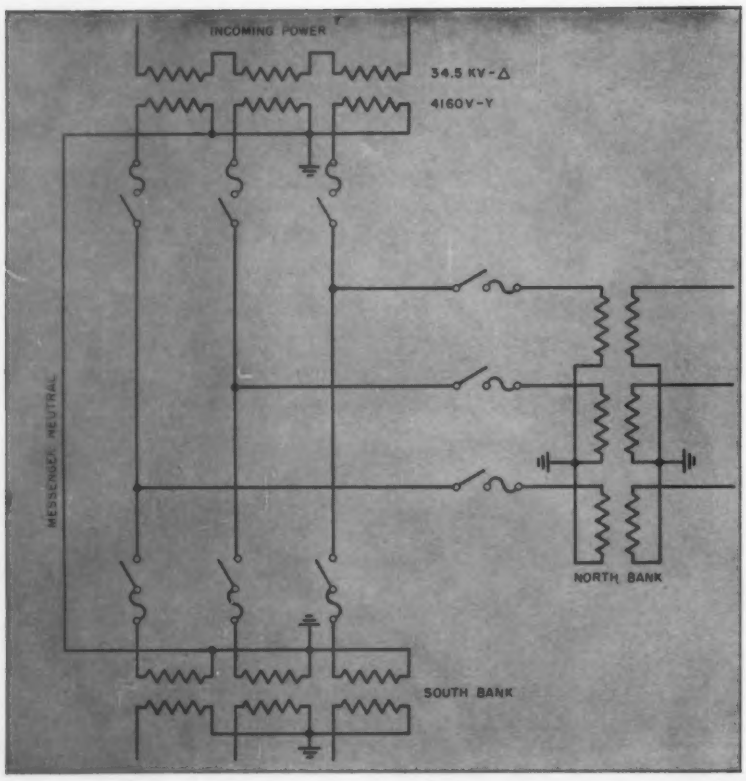


Fig. 5. Schematic wiring diagram of the plant primary distribution system

handle the present known load and has an expansion factor of 20 per cent with the present transformers. The expansion factor can be boosted another 25 per cent by changing the three outdoor type transformers to the next larger standard size. Inasmuch as the sub-stations were to receive power from the utility at 4,160 v, a method had to be devised to distribute power at this voltage. One of our sub-stations, a new one, is located about 500 ft away from the utility's main sub-station. It lies near the southern extremity of the plant. The utility company supplies the plant at a point located roughly north of the plant. Supplier owns left bank in Fig. 1.

Several possibilities of transmitting power at 4,160 v were available. To assist us in deciding on the best possible arrangement, we invited an engineer from the utility company and a representative from the cable manufacturer to sit down and discuss with us our mutual problems.

We checked on what the market had to offer in the way of unit sub-stations. There certainly is some very good equipment available today but it also costs money. Since we could not see any major gain in our case by using standard package unit sub-stations, we did not feel that we could justify the additional expense. Therefore, we explored the possibility of using standard type single-phase transformers of the type used by the utilities. See Fig. 3.

These transformers present several advantages to us: 1. Their cost is considerably lower. 2. They stand outside and do not take up valuable inside floor space. 3. Only ⅓ of the capacity needs to be replaced in the event of failure because of using single phase units. 4. Units are standard utility company type. In emergency, the utility company will make us a temporary loan of one of their spares.

Returning to the distribution problem, here are several possibilities that presented themselves: 1. Use of neoprene-covered cable buried in a trench along the foundation of the building. 2. Running the cable in the plant suspended from the ceiling. 3. Running interlocked armored cable over the roof.

In our opinion, the underground installation offered the best solution. Both from the point of view of first cost and from that of having the high

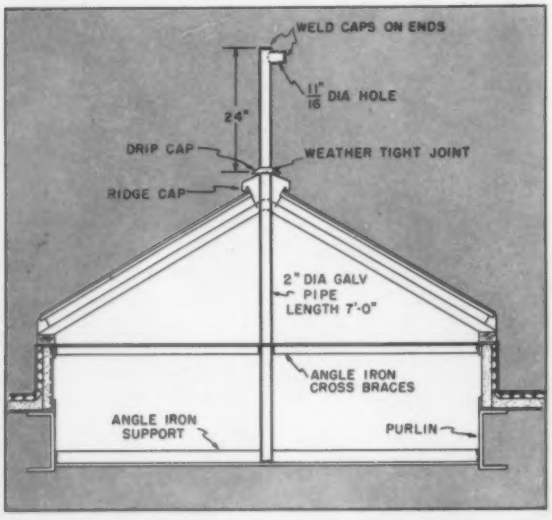
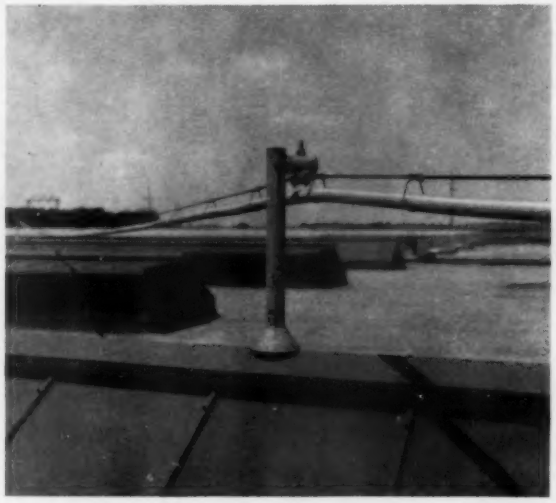


Fig. 6. Cross section of typical skylight, including standard

Fig. 7. Close-up of standard projecting through skylight ridge



voltage hazard buried in the ground outside the plant buildings. Here is where the cable supplier "earned his salt."

He quickly advised us that a fault in an underground cable is extremely difficult to locate. He further pointed out that they normally experience only one fault in 500 miles of cable. He cautioned us, however, that in the event we did have such a fault, or in the event that someone inadvertently dug into the vicinity and struck the cable, the consequences would be rather costly. To locate a cable failure, it would be necessary to begin at one end and dig along the cable until the fault would be discovered.

The second plan, namely that of running the cable through the plant did not appeal to us. Due to the type of construction of our one story plant which was built in several sections, the high voltage cable would be somewhat difficult to run and would be quite unsightly. Also, we were reluctant to have a 4,160 v feeder inside our plant since we had not had any previous experience with voltages of such magnitude. We were afraid that a workman might accidentally drill into this cable with very sad results.

The third plan, that of running cable over the roof, did not appeal to us. We considered the possibility of a wire breaking due to ice or a severe storm, remote though it may be.

Armored Cable

Again, this is where the cable supplier came into the picture suggesting to us a 5,000 v rubber insulated flexible armored cable. As the installation now stands, this cable is supported from a messenger which is grounded. The messenger cable in turn is suspended from welded pipe standards projecting through the ridge of the plant sky-lights. See Fig. 7.

The standards made of 2-in. galvanized pipe derive no support from the sky-light but are welded firmly in place at the bottom of the roof purlins and at the top of the sky-light framing. See Fig. 6. This construction transfers the load from the messenger to the structural members of the building itself. Weather caps welded to the standards prevent rain or snow from entering through the openings cut through the ridge of the sky-light. A distance of about 500 ft was spanned by using the standards and pole anchors at the sides of the plant. Five intermediate supports were used, one to every other sky-light. The sag even on hot summer days is found to be not excessive. See Fig. 2.

It might be well to mention that after the cable had been pulled into place, the messenger clamps were left quite loose. They were left that way for about two days during which time the messenger shifted sufficiently to distribute the sag.

We, of course, anticipate no trouble with this feeder and have had none during the first year of its life. However, we are aware of the fact that a fault in the cable will discolor the armor on the outside. In order to find the location of a fault it would be necessary to open the high voltage disconnect switches then the discolored portion of the armor could be located by walking along the run on the roof. The armor could be peeled off and the necessary repairs made. This procedure is a lot simpler than digging up the entire length of the high voltage feeder to locate a fault.

Power from the sub-station that is fed by the cable on the roof naturally goes through a switchboard to distribution panels. Runs from this switchboard to the panels are in standard conduit installed overhead.

I should like to comment on the switchboard that is fed by the sub-station near the north side of the plant. As men experienced in electrical installation work know, a switch rated at 2,400 amp cannot carry 2,400 amp —unless it is especially constructed. Therefore, we have replaced the conventional type switch with a Pringle switch which can carry its rated capacity.

This main disconnect switch is followed by fuses which protect 500 MCM feeder cables. This switch is unique in its operation. From the vertical position the handle is moved counter-clock-wise to a horizontal position to disconnect the power supply.

To close the switch, the handle is restored to its vertical position. However, raising of the handle through the first 45 deg, approximately, of the arc causes the blades of the switch to enter mating jaws. Movement through the next 45 deg, approximately, effects a clamping action between the jaws and the blade. This results in considerably more tension at this point than is found in the average switch. The clamping action accounts for its ability to carry the rated load.

A close observation of the switchboard will disclose a concrete ledge at the foot. This ledge is on the edge of a cavity or trough that extends about 12 in. below the surface of the concrete floor.

From this pit, the 500 MCM feeders run into a 4-in. fiber duct. The feeders are in groups of three along with a 00 neutral wire. The duct runs underground diagonally to a building column at which the power distribution panel is located.

The end of this duct is connected to pipe conduit protruding through the floor. The distribution panel rests on this conduit.

We have carefully laid out the location of these particular feeders on the electrical construction drawings. In addition, we were insistent on having them located exactly where the drawings showed them. If it should become necessary to excavate the floor in the area including the conduits, we will know accurately where they are.

There are several reasons for handling the feeders the way that we did: 1. Roughly, the diagonal run between the distribution panel and the switchboard follows the shortest possible course. 2. It was faster to dig a small trench and lay a fiber duct in its place than to hang a 4-in. steel conduit. 3. Overhead building construction did not interfere in running the feeders. 4. Conduit drops from an overhead run to distribution panels and switchboard panels would be needed. Their material and installation cost was avoided.

I should like to call attention also to the fact that the lighting distribution panels are of the column type, Fig. 8; all the neutral wires are fastened to a neutral buss at the ceiling. Only the phase wires are brought down the column to the distribution panel. This column type panel serves two purposes: 1. It protects the lighting distribution panel against damage. 2. It saves running the white neutral wire of each circuit from the ceiling down to the distribution panel.

This overall project has taught us that it is a good idea to consult with a capable engineering representative of both the utility company and the material or equipment manufacturer.

Fig. 8. Flanges guard the light panel

Fig. 1. A departmental supervisor sorts the dash-numbered tool requisitions by name of employee making the requisition. He can thus determine how many tools were requisitioned by each employee during the month. Too many tool requisitions by one employee can then be checked on and improper reasons for tool withdrawal can be quickly corrected

Tool Costs Down 1½ Million Annually—

Controls, Common Sense, Cut Perishable Tool Losses

WHEN THE MONTHLY perishable tool costs at the El Segundo Division of Douglas Aircraft Company reached a point where they would total $5,000,000 annually, company officials took a long look at the figure and decided it was too big. Eight months later, these same monthly perishable tool costs had been reduced to a point where they would total only $3,500,000 annually—a flat 30 per cent reduction. This was accomplished despite a slight increase in production man hours worked during the drive to reduce these costs.

When asked how they accomplished the feat, Douglas officials have a ready answer. "Downward pressure on perishable tools costs . . . Some of it applied administratively, some of it by cudgeling, but most of it by applied psychology."

It fell to the Perishable Tool Group in the Plant Engineering Division to pressure these costs downward. Fred Lorenz, head of this group, readily admits that they did not know just where to start.

There had never been any tight controls on the use of perishable tools. They were charged out in bulk lots to specific tool cribs, and at that point all accounting paper work ceased. Employees could requisition the tools directly from the cribs whenever they needed them, and could return broken tools for replacement without any permanent paper work that would indicate what had happened to the broken tool.

Tool crib dollar inventory sheets were not used. The theory behind this loosely controlled setup was that by making it easy for the employees to get perishable tools whenever he needed them, it would allow him to spend more time on his job. He wouldn't have to waste the time required to seek a signature on his tool requisition, and thereby could return to his work more quickly.

"But like so many theories, this one failed to include the human element," Lorenz says.

Fig. 2. Tool crib attendant pulls a card on a perishable tool from inventory file, will note on it that tool has been requisitioned. This gives running inventory of tools on hand

Fig. 3. Here a cold-light extension cord is being used for illumination. Formerly, flashlights were used but cost of operating them was higher than cost of operating extensions

Two sets of forms, some intelligent problem-facing and a lot of psychology went into the elimination of needless waste of parts and tools at Douglas . . . One example: Enough flashlights were returned on one drive to keep the company stocked for several years

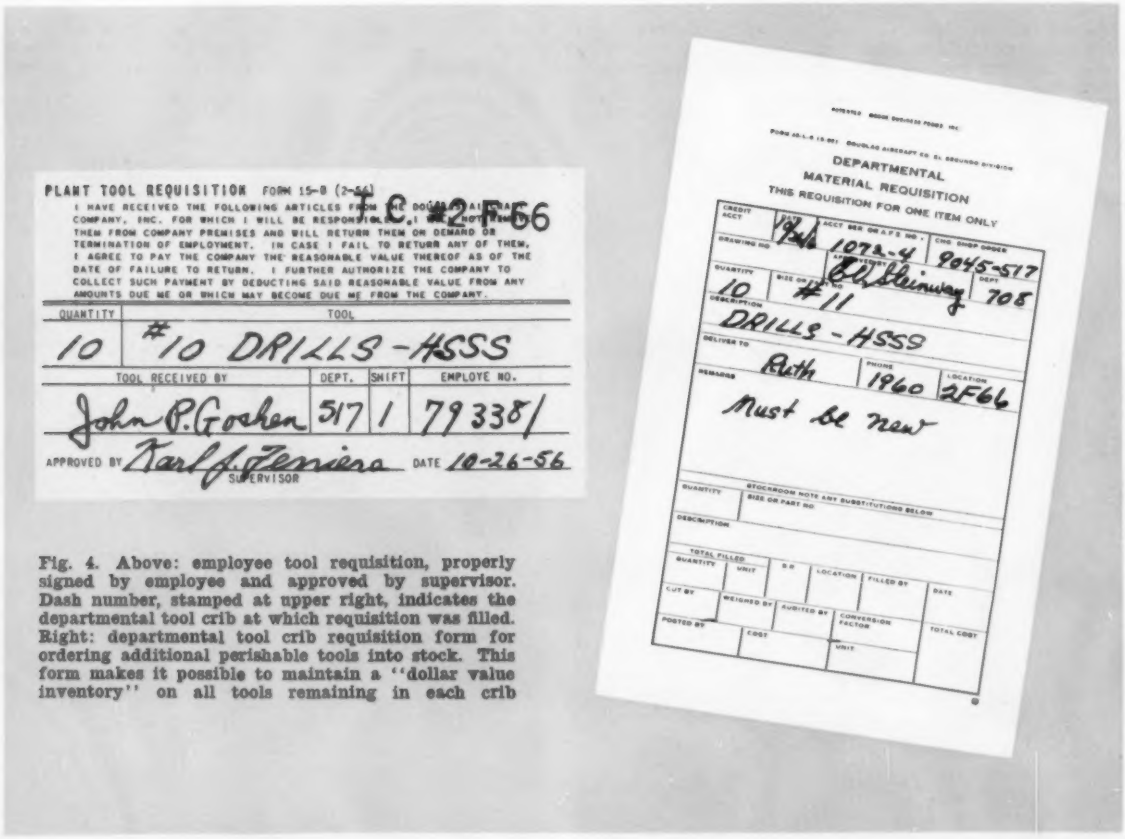
The perishable tool cost reduction drive was instigated by first seeking direct aid from top production management. The plant production superintendent was asked to call a series of meetings including all assistant superintendents, general foreman, and assistant foreman at which the perishable tool subject would be discussed.

After several meetings, a stopgap was reached which resolved itself into a simple question—"What are we going to do about it?"

The first decision reached was that each employee seeking a new perishable tool, or a replacement tool, from a tool crib would have to obtain the signature of his foreman or assistant foreman on the requisition. Within a month after the inauguration of this rule, the results began to show. Chronic tool breakers and tool losers began to feel ashamed of returning time and again for the signature of their foreman. And when requests for a requisition signature became too frequent from the same employee, it acted as a warning to the foreman to investigate. Many times slight corrective measures, like telling an employee how to hold his hand drill, or how to line up his work, would remedy the situation.

Second major decision was to use a dash number on each tool requisition that would indicate the department in which it was used. At first a dash number was used for a group of departments doing similar work, but this proved a rather useless gesture. Tool breakage and misuse had to be pinpointed before it could be remedied, so it was decided to use a dash number for each department. Thus the dash number, the foreman's signature and, the employee's name on each requisition would lead directly to where the tool had been broken or lost.

These dash numbered requisition slips proved extremely useful from the very start. At the end of each month, the perishable tool requisitions could be sorted according to the department in which they had originated, then



PLANT TOOL REQUISITION FORM 15-B (2-54)

I HAVE RECEIVED THE FOLLOWING ARTICLES FROM THE DOUGLAS AIRCRAFT COMPANY, INC. FOR WHICH I WILL BE RESPONSIBLE, AND WILL NOT REMOVE THEM FROM COMPANY PREMISES AND WILL RETURN THEM ON DEMAND OR TERMINATION OF EMPLOYMENT. IN CASE I FAIL TO RETURN ANY OF THEM, I AGREE TO PAY THE COMPANY THE REASONABLE VALUE THEREOF AS OF THE DATE OF FAILURE TO RETURN. I FURTHER AUTHORIZE THE COMPANY TO COLLECT SUCH PAYMENT BY DEDUCTING SAID REASONABLE VALUE FROM ANY AMOUNTS DUE ME OR WHICH MAY BECOME DUE ME FROM THE COMPANY.

TC #2F66

QUANTITY	TOOL
10	#10 DRILLS - HSSS

TOOL RECEIVED BY	DEPT.	SHIFT	EMPLOYE NO.
John P. Goshen	517	1	79338/

APPROVED BY Karl J. Ferreira (SUPERVISOR) DATE 10-26-56

DEPARTMENTAL MATERIAL REQUISITION

THIS REQUISITION FOR ONE ITEM ONLY

CREDIT ACCT. 1078-4 ACCT. REF. OR A.F.E. NO. 9045-517 DEPT. 705

DRAWING NO. QUANTITY 10 SIZE OR PART NO. #11 DESCRIPTION DRILLS - HSS

DELIVER TO Ruth PHONE 1960 LOCATION 2F66

REMARKS Must be new

QUANTITY STOCKROOM NOTE ANY SUBSTITUTIONS BELOW SIZE OR PART NO. DESCRIPTION

TOTAL FILLED QUANTITY UNIT S.O. LOCATION FILLED BY DATE

CUT BY WEIGHED BY AUDITED BY CONVERSION FACTOR TOTAL COST

POSTED BY COST UNIT

Fig. 4. Above: employee tool requisition, properly signed by employee and approved by supervisor. Dash number, stamped at upper right, indicates the departmental tool crib at which requisition was filled. Right: departmental tool crib requisition form for ordering additional perishable tools into stock. This form makes it possible to maintain a "dollar value inventory" on all tools remaining in each crib

returned to the department for study by the supervisory personnel. In the department, the requisitions could be further broken down by employee name, and employees who had requisitioned an unusual number of tools during the past month could be contacted for an explanation.

"Results here were due largely to the psychological situation created," Lorenz explains. "While the dash numbered requisition slips made it possible to ferret out chronic tool breakers and tool losers and apply remedial measures, far more perishable tools were saved by the fact that each employee knew he could be pinpointed for each tool he withdrew from a crib."

A second use of these dash numbered requisitions is made by the perishable tool liaison group. When excessive breakage occurs in one class of tools, or while doing a particular job, this group makes an investigation to see what can be done about it.

With each perishable tool requisition properly dash numbered by department, the perishable tool group from Plant Engineering then approached the Accounting Department and asked them to make a direct breakdown of perishable tool costs in each department.

When the total cost of the perishable tools used in a single department was known, along with the number of hours of direct labor accomplished (a figure that was obtainable from the cost accounting department), it was easy to break down perishable tool costs to so much per hour for each hour of direct labor performed.

Perishable tool costs per hour of direct labor were extremely useful in charting the progress of the drive to reduce perishable tool costs. While total perishable tool costs will normally show fluctuations in concert with employment or production, when these costs are spread over the number of hours of direct labor worked, the cost per direct labor hour will not change greatly regardless of fluctuations in employment or production.

Now when a departmental supervisor at Douglas is handed a sheet showing the cost of perishable tools for each hour of direct labor in his department during the past month, he can immediately compare it with previous figures and ascertain whether the situation is getting better or worse.

A number of incidents occurred during this perishable tool cost reduction drive that may reveal to others where their perishable tools are disappearing. It was noted, for instance, that over 250,000 flashlight batteries were consumed each year. This seemed unusual in a well-lighted plant equipped with numerous cold-light extension lamps mounted on drop cords and with special jig lighting in places where drop cords could not be easily used.

Because of this, all flashlights were called back into the tool cribs. At this time it was discovered that some employees had as many as eight flashlights checked out in their name, but only one flashlight to return. None of these lost flashlights were investigated or charged against any employee, yet at the same time so many flashlights were returned that no new flashlights will have to be purchased for several years.

During this part of the drive, each place in which flashlights had been used was investigated. It was found that in at least 50 per cent of the cases, a simple drop cord light would suffice. Today, when an employee wants to draw a flashlight out of a tool crib, he must first establish a reason for it and obtain the proper signature.

Replacement flashlight batteries are also controlled. It is no longer possible for an employee to approach a tool crib and order six new flashlight batteries to replace the six batteries in the flashlight he is using. Each battery is tested separately, and only

Monthly analysis sheet showing the cost of perishable tools both in total dollars and in cost per hour of direct labor. Cost per hour of direct labor is not greatly influenced by fluctuations in either production or employment. A single glance at this monthly analysis sheet indicates to a departmental supervisor whether his perishable tool costs are going up or down

	Control Base Direct Labor Hours	Total Expense Amount	Control Base Hours	Cost Per Direct Hour
LOCATION B				
Factory Superintendent				
A3D Assembly	A3D Assembly Depts.	$ 7,647.51	124,573.0	$0.061
A4D Assembly	A4D Assembly Depts.	6,464.95	123,103.1	0.053
Fabrication	Fabrication Depts.	73,308.23	271,620.6	0.270
Production Control	Sub-Assembly Dept. 515	1,334.59	20,444.9	0.065
Hangar Operations	Hangar Operations Dept.	1,966.35	168,930.8	0.012
AD Assembly and A3D Modification	AD Assembly and A3D Modification Depts.	10,214.13	69,184.9	0.148
Sub-Total Factory Superintendent		$100,935.76	777,857.3	$0.130
Tooling and Pre-Production	Tooling and Pre-Production Depts.	34,459.65	858,309.5	$0.040
Plant Engineering	Manufacturing and Tooling Depts.	5,432.96	1,256,497.2	0.004
Miscellaneous Depts.	Manufacturing and Tooling Depts.	2,169.30	1,256,497.2	0.002
Total Location B	Manufacturing and Tooling Depts.	$142,997.67	1,256,497.2	$0.114
LOCATION B6				
Factory Superintendent				
F4D Assembly	F4D Assembly Depts.	$ 7,020.76	217,539.8	$0.032
F5D Assembly	F5D Assembly Depts.	25.50	4,077.9	0.006
AD Assembly and F4D Major Sub-Assembly	AD Assembly and F4D Major Sub-Assembly	11,810.82	117,613.0	0.100
Fabrication	Fabrication Depts.	54,781.75	225,122.9	0.243
Production Control	Enclosures & Plastics	1,034.62	55,578.5	0.019
Sub-Total Factory Superintendent		$ 74,673.45	619,932.1	$0.120
Tooling	Tooling Depts.	$ 7,486.02	125,920.6	$0.059
Plant Engineering	Manufacturing and Tooling Depts.	8,125.94	863,026.1	0.009
Miscellaneous Depts.	Manufacturing and Tooling Depts.	3,497.83	863,026.1	0.004
Total Location B6	Manufacturing and Tooling Depts.	$ 93,783.24	863,026.1	$0.109
Total Location B & B6	Manufacturing and Tooling Depts. (Location B & B6)	$236,780.91	2,119,523.3	$0.112

those testing below an established minimum are replaced.

In another case, Cleco skin clamps were being purchased at the rate of 50,000 clamps a month. If an employee needed 200 skin clamps, he had but to approach a tool crib and they were counted out to him. This case was more difficult to solve than the flashlight problem. Cleco skin clamps are an utterly worthless device for anything except their intended purpose. There could be no incentive to make away with them, or hoard them for any reason. But a quick tour through the plant by the Perishable Tool Group revealed thousands of Cleco skin clamps scattered on the floor, flung loosely in tool boxes, bench drawers, and pigeon holes. The floor sweepings from many departments contained hundreds of carelessly dropped clamps.

It was decided that psychological propaganda would have to be used to cure this situation. To instigate this part of the campaign, a "mysterious" question was passed through the production departments—"Would you, if you saw a dime, nickel, and a penny in a pile on the floor, stoop to pick it up?" In due time, this question was followed by the inspirational punch. It was pointed out that the cost of Cleco clamps averaged about 16c each, and that they were well worth retrieving when dropped or scattered.

This bit of psychology had almost magical results. Cleco clamps began pouring in on the tool cribs by the hundreds and thousands. Lorenz sums up the final results with a grin . . . "We just don't have to buy new Cleco clamps anymore, except for a few hundred specialized types each month. The amount of clamps we accumulated during this drive will last us for many years."

Final major decision in the perishable tool costs reduction drive was to keep a perpetual dollar value inventory of tools on hand in each tool crib. Prior to the time, no inventory was available of tool crib contents after the tools had been charged out to the crib. Now an inventory card is used for every item in the crib. When a tool is requisitioned, it is marked against this card. This way, a perishable tool liaison man can check the card at the end of each month, and ascertain exactly how many tools were used and how often.

After installation of this inventory system, and after a few checks had been made, it was discovered that nearly all tool cribs were chronically overstocked. One crib had 400 files, yet the number of requisitions for files during each month indicated that 25 files would suffice. The same applied to cutters, end mills, etc., in the machine shop tool cribs. In checking into this, it was found that the attitude of most tool crib operators was that they'd rather have too many tools on hand than to run out.

As a result of this check, and installation of the inventory card systems, the inventories of every tool

(Continued on page 242)

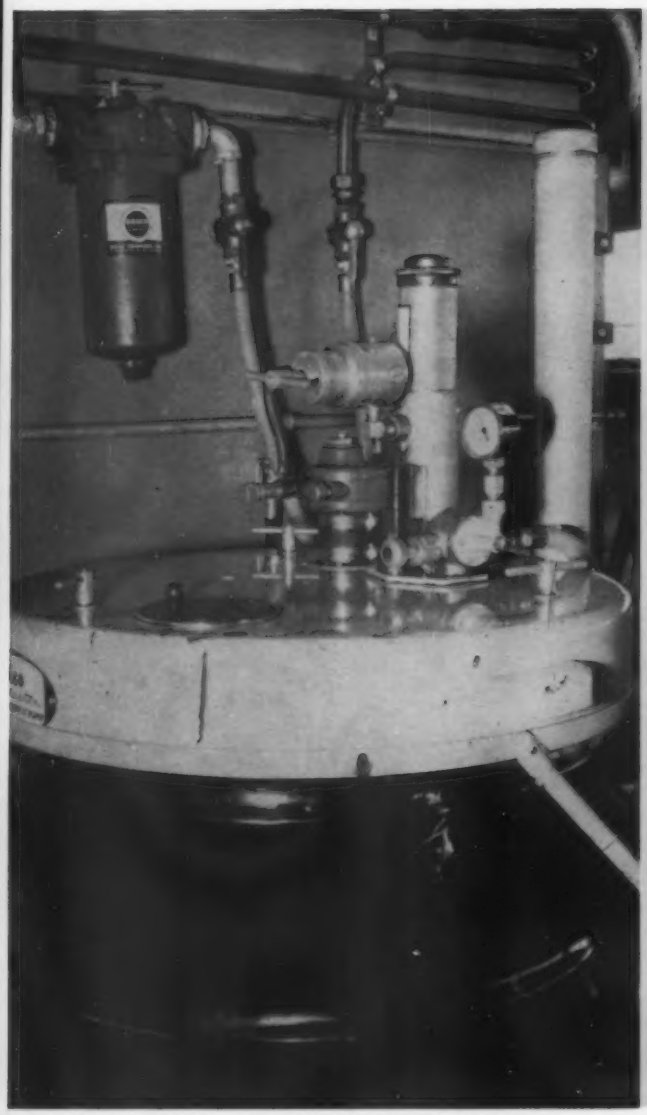


Fig. 1. Operating position of drum-pump for hot spray

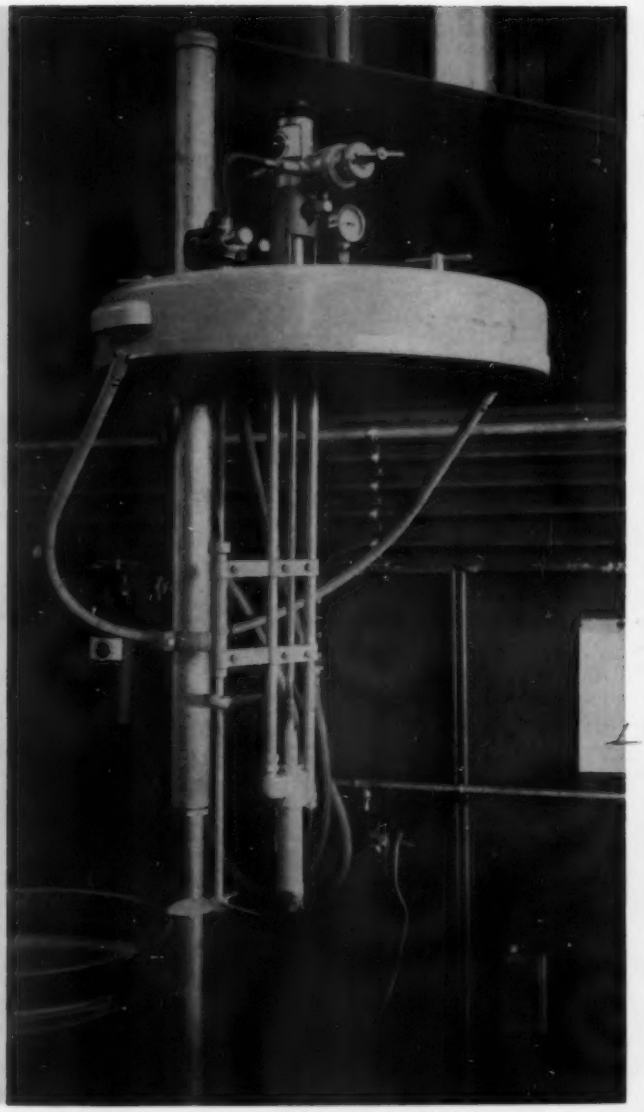


Fig. 2. Elevated position of equipment showing pump

Fig. 3. Note absence of mist in this hot spray paint booth

This is How the Hot Spray Process Works

In hot spray, heat is substituted for thinner in reducing paint to spraying viscosity. This heat-thinned high-solids material atomizes readily at the spray nozzle. Most of the hot solvents are flashed off between the gun and the surface being coated leaving only enough solvent to permit flowout to a smooth dense film. As delivered to the spray head, the paint has lower-than-normal viscosity. This permits atomization at reduced air pressures with resultant decrease in misting and overspray.

The high solids content of the paint with the solvent flash-off at the gun provides the following additional advantages:

1. Greater film build due to low shrinkage of drying film.
2. Smoother finish, improved covering of pits, flaws and scratches. This is also a result of reduced shrinkage.
3. Improved coverage per coat. This offers the possibility of reducing the number of spray coats required.
4. Stops sags and runs.

What's the Story on Hot Spray Finishes?

By LEROY HUTZLER III, Medium Transformer Dept., General Electric Co.

SPRAY PAINTING is the most popular, and the most wasteful, industrial method of applying organic finishes. Although it is fast and lends itself to automatic application, spraying can waste between 40 and 80 per cent of the material delivered—and this even on large surfaces like appliances and automobiles. Now, waste in a process is to an engineer what plague in a population is to a doctor. Let's look at a few of the treatments that have provided partial cure for this chronic problem:

Steam Spray—Dry superheated steam is used in place of compressed air for atomizing the paint. By the condensation of the steam to liquid water the blast of atomizing gas reduces in volume instead of expanding as does compressed air. In this manner the tendency of the atomized paint particles to blow away is reduced.

Airless Spray—In the airless spray process heat and hydraulic pressure are utilized to atomize paint without the use of compressed air. The paint is heated under a pressure of several hundred pounds per square inch. A simple high pressure atomizing nozzle is used for spraying. No fog is produced by this process as the paint particles are heavier than air and fall as force is dissipated.

Electrostatic Spray—This process may be operated either with or without atomizing air. Paint is atomized by one of several means and the particles are charged with a high static voltage—in the order of 100,000 volts. When grounded metal ware is conveyed past the atomizing system these charged particles are attracted to the surface. Extremely high material efficiencies have been reported in suitably applied electrostatic painting systems.

Each of these developments has numerous applications but each has demonstrated definite limitations in areas where it can be used. The hot spray process, because of its more universal adaptability, is in our opinion, a major advance in the economic reduction of overspray and solvent waste.

Every painter has experienced the frustration of trying to spray cold paint on a cold day. The chart, Fig. 4, illustrates the problem by plotting the change of viscosity with

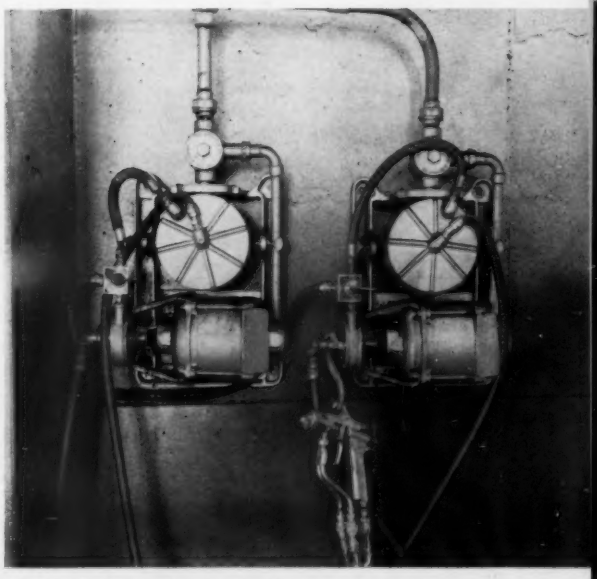


Fig. 4. Paint heater installation showing twin hose

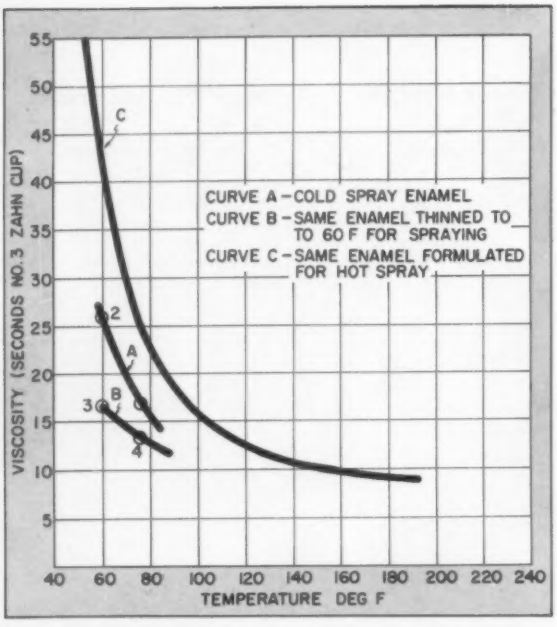


Fig. 5. This set of three curves shows viscosity plotted against temperature for enamels under three conditions

temperature. Curve A represents a normal cold-spray paint. At 77 F (point 1) its viscosity is about 17 seconds (No. 3 Zahn cup). On a chilly morning the paint is cold and thick. Solvent must be added to cut the material to 17 seconds before spraying (point 3). This produces a lean mixture that covers poorly. By midday the thinned paint has warmed up and the viscosity has slid down curve B to point 4. Now it has become so thin and watery it will run and sag before it covers the work.

A typical synthetic enamel is approximately 20 per cent thinner at 70 F than it is at 60 F. Up the temperature scale another 100 deg we find only about 2 per cent difference between 160 and 170 F. The paint is no longer sensitive to temperature changes of 10 or even 20 deg. Curve C represents the properties of a synthetic enamel formulated for hot-spray application.

The assortment of hot spray systems is as variegated as man's imagination. Among the models are units that heat the paint by electric hot-plate, by steam, by hot water, or by hot air.

Accessory equipment for hot spray painting includes spray guns and hot-fluid hoses. Normally a conventional spray gun is used. It should be equipped with a smaller fluid nozzle and a different air cap to permit best utilization of the low hot-paint viscosity and the low atomizing air pressure. These are stock parts with all spray gun manufacturers.

All hot paint systems require use of special hose materials to resist the hot solvents. Most hose manufacturers and, no doubt, all manufacturers of hot spray equipment will be able to supply this hose from stock. For circulating paint systems a twin fluid hose supplies paint to and from the heater and the gun. The equipment shown in Fig. 4 maintains satisfactory circulation in hoses of 30 ft operating length, (60 ft overall circulation). Note the twin hose connection on the spray gun in the photograph.

In applying a paint or lacquer to the hot spray system some formula change is nearly always required. The materials must be specifically blended with a proper solvent balance for hot spray application. Most paint manufacturers can provide this technical advice on their product and frequently can supply the paint pre-thinned to hot spray viscosity.

Normally a cold-spray formulation contains fast solvents that produce a dry spray or an orange peel finish when applied hot. On the other hand, too much slow solvent will produce a wet film that sags before drying.

Proper blend of fast and slow solvents for hot spray permits the application of a heavy paint film which will flow out to produce maximum gloss. At the same time the film will support its own weight without sagging or running. Many synthetic enamels, for example, can be hot sprayed in films as thick as two to three mils.

Paint Handling—The paint required for hot spray is only slightly thinner than conventional paints manufactured and shipped at brushing viscosity. At this high viscosity the hot spray paint is quite stable enough for shipping and storing in a ready-to-use condition. Paint manufacturers can supply this paint in standard containers.

Since the paint can be purchased ready-for-use, an obvious advantage can be realized in using it directly from the shipping drums. Standard equipment, as in Fig. 1 and 2, can be provided for agitating and dispensing the material directly from drums to one or more spray guns. The same pump is capable of supplying a pressurized circulating system a thousand or more feet in length.

Process Control—As noted above the operation of hot spray is entirely independent of room temperature conditions. It is also true that heated paint temperatures can vary widely without affecting spray efficiency. Most paint heaters maintain temperatures between 160 and 180 F.

While the viscosity of hot paint is relatively insensitive to temperature it is also unaffected by fairly wide changes in cold viscosity. To illustrate this thermal immunity, a paint having cold viscosity ranging from 25 to 35 seconds (No. 3 Zahn cup at 25 C) can be successfully hot sprayed. For cold spray the same paint must be controlled between 15 and 17 seconds viscosity.

When the 25-35 sec paint is heated its consistency drops below the normal cold spray viscosity. This permits spraying with 15 psi fluid pressure and 30 psi atomizing air pressure. These values may better be appreciated when compared to the 25 psi fluid pressure and 60 to 80 psi air pressure previously required for cold spray atomization.

Results Obtained—Use of the hot spray process has accomplished the following gains in General Electric's Medium Transformer Plant, where all applications were previously served by conventional spray painting:

1. Reduced overspray loss. Approximately 21 per cent saving on paint consumption.
2. Eliminated solvent consumption at point of use. Considering pre-thinning and paint economies this amounts to a real solvent saving of approximately 75 per cent.
3. Improved paint coverage per gallon.
4. Improved finish appearance and quality.
5. Production of uniform finish regardless of room temperature.
6. Reduced mist and fogging nuisance.
7. Less clean-up and maintenance cost through decreased overspray.
8. Lower consumption of compressed air.

Specifically, we estimate an overall reduction of 37 per cent in overspray waste. Solvent consumption is completely eliminated, since we now receive our paint with approximately 10 per cent thinner already added. The wide range of usable spray viscosity eliminates the need for solvent addition during use. Cold spray practice involved the addition of 25 per cent thinner in our mixing room. Periodic additions of thinner were necessary.

Through the use of the drum pump 50 min labor has been saved in the handling of each drum of paint.

Our spray painters have been enthusiastic about the ease of producing smooth coats and the lack of fog and solvent fume. In certain spray applications, for example, inside large junction boxes, it was formerly necessary that the painter stop several times while spraying to allow the fog and fume to dissipate. This problem has been completely eliminated with hot spray, as shown in Fig. 3.

On irregularly shaped small parts, there was overloading which caused film sags and runs. With hot spray these difficulties have been reduced to nearly zero.

PM for Pressure Regulating Valves

Scheduling Approach Applicable to Other Equipment

By **ERNEST O. GRAFE**, Field Engineer, Spence Engineering Co., Inc., Walden, N. Y.

ECONOMICAL PREVENTIVE maintenance must be carefully thought out to avoid some excesses that develop so easily. Probably the most costly excess is based on an annual shut-down during which everything (except the doorstops) is taken apart and practically rebuilt. There is much equipment in any plant which can be expected to run without attention for more than one year. Obviously unnecessary overhaul of equipment builds useless maintenance overhead.

Annual overhaul may involve considerable overtime wages (to finish the job in the shortest time) plus perhaps the expense of extra, short-term help. There is equipment in any plant which can be isolated even while the plant is in production. If this equipment were overhauled as necessary on a continuing basis, the over-all cost of the annual overhaul would be considerably reduced.

During annual shutdowns, personnel, sometimes inexperienced, is working "under pressure" to finish the job. The work will not be done as meticulously as might be desired and extra expense is incurred later to correct the result of hurried work.

Many a plant engineer, realizing the shortcomings of the annual shutdown, will inaugurate a continuous preventive maintenance plan. This is highly desirable but usually everyone in the plant engineering department is too busy to plan a program properly. The system ends up being run by the plant engineer on a "look and remember" system. He looks at a piece of equipment on a tour through the plant and remembers it's about time to check it.

When the plan deteriorates to this point, pieces of equipment not in plain sight, such as regulating valves, will be forgotten. Large pieces of equipment are remembered but require more time than is available at the moment. Overhaul is postponed and forgotten again. In the end this system usually breaks down to the point of making immediate repairs on items that have broken down (because they were overlooked). Preventive maintenance as such is completely forgotten.

Let's assume the plant engineer in the foregoing case is given a shutdown period during which he can bring everything in his plant up to date. He then realizes that preventive maintenance on a continuous basis is valuable but that it must be controlled.

The first thing that is required is an equipment list. This equipment inventory should show all of the data re-

Fig. 1. Sample shows one way of keeping information for the convenience of the plant engineer, supervisory personnel

Valve — Pressure Regulating

Location - Building 10, Basement, Main Steamline

Size: 4" Mfg by: Spence Engineering Co, Inc.

Serial No.: EC 472 (Main Valve) type: ED

Supplier: J. F. Stevens Co. Phone EM 7-2020

Placed in Service: 4/2/53 Inspect & Clean: every 18 mo.

History:

4/12/53 Stock closed - Pilot screen clogged. Valve very dirty - cleaned. Main strainer - ditto

10/5/54 Routine inspection - slightly dirty - cleaned - seat, disc & diaphragm OK - not replaced

4/12/56 Routine inspection - Valve clean - Seat & disc OK - Diaphragm slightly corroded - replaced

Check Water Treatment

PM Questionnaire for Regulating Valves

Nature of the Equipment

Are there many moving parts?
Are there any rubbing surfaces to wear?
Are tolerances otherwise large to resist sticking by dirt?
Are parts designed to operate at low stresses?
Are materials those best suited for the service?

Severity of Service

Is the regulator working at pressures, temperatures, flows for which it was designed?
If within design conditions, is temperature or pressure on the high side?
Are there long periods of near maximum or near minimum load?
Is there much cycling of the load?

Character of the System

Is the plant steam clean?
Is a strainer and/or dirt leg provided?
Is plant steam wet at the regulator location?
Are adequate traps provided?
Does installation conform strictly to the requirements of the regulator design?
Is there a by-pass?

Importance of the System

Will momentary outage of the regulator (until the system can be put on the bypass):
Cause loss in production, dangerous condition or only inconvenience?
Will several hours or days outage:
Cause loss in production, dangerous condition or only inconvenience?

quired for ordering replacement parts for each item on the list plus a notation as to the location of that item in the system. The form in which this list is kept is material only with respect to the accessibility of information and the ease with which the list can be kept current. Probably a card file with one item per card arranged by classes of equipment (such as pumps, traps, regulating valves, etc.) is the most convenient. See Fig. 1.

Having such carded information the plant engineer can, with aid of foremen (in a larger plant) and with sales engineers for the various pieces of equipment involved, arrive at reasonable frequencies for preventive maintenance as well as the extent of such procedures on the basis of: 1. manufacturer's recommendations; 2. actual experience with the equipment as installed, and 3. the importance of preventing unexpected failure. In some cases it may be economical to wait for a failure before any work is performed.

As a followup on the work done in establishing the maintenance schedule, notes should be made on the original listing of anything found in the overhaul or the unexpected breakdown which would indicate a need for revision of the schedule. There is no substitute for the plant engineer's experience with the equipment in setting up a schedule. A written record of such experience is much more reliable than an individual's memory and will help in maintaining the continuity of the system despite personnel changes.

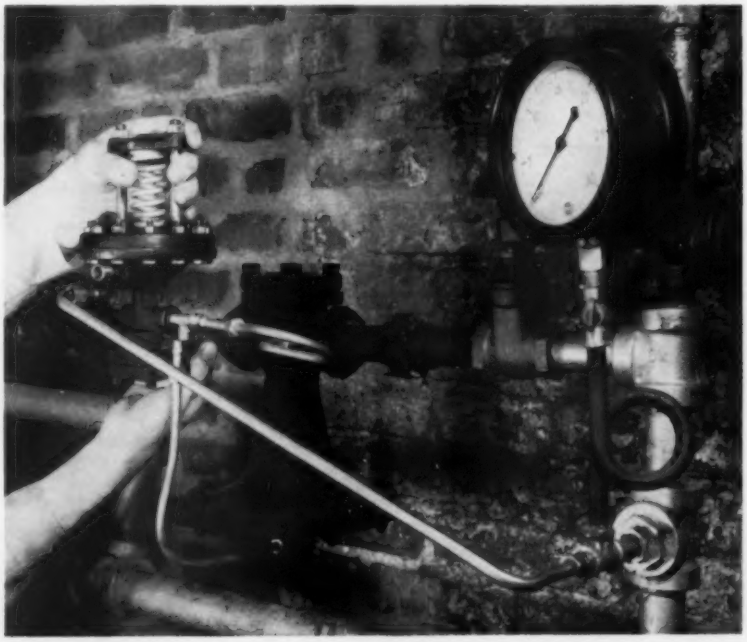
This article presents questions for facts to be established in setting up a schedule for preventive maintenance on regulating valves but the same procedure can be followed for any piece of equipment. To determine the duration of uninterrupted service that can be expected, find out the possible causes of failure (of a regulator valve in this example).

At design conditions and in normal service on perfectly clean steam, a valve would have the maximum normal life as indicated by the manufacturer. If the application is determined to be severe, the maximum normal life of the valve should be shortened a proportionate amount. If the system in which the valve is placed is poor, without strainers, dirt legs, traps, and so forth, the life of the valve should be shortened another proportionate amount from the normal expectancy. In Fig. 3 is shown a regulator station with the proper accessories.

After considering the valve, the service and the installation if indications are for a service life less than one year, corrections should be made or the regulator station will become a source of annoyance and an unnecessary maintenance expense.

In deciding a move, the importance of the system will at times be of overriding consideration. If even momentary outage will produce considerable product loss, doubling up, installing

Fig. 2. Pilot valve can be replaced by spare while being checked and repaired



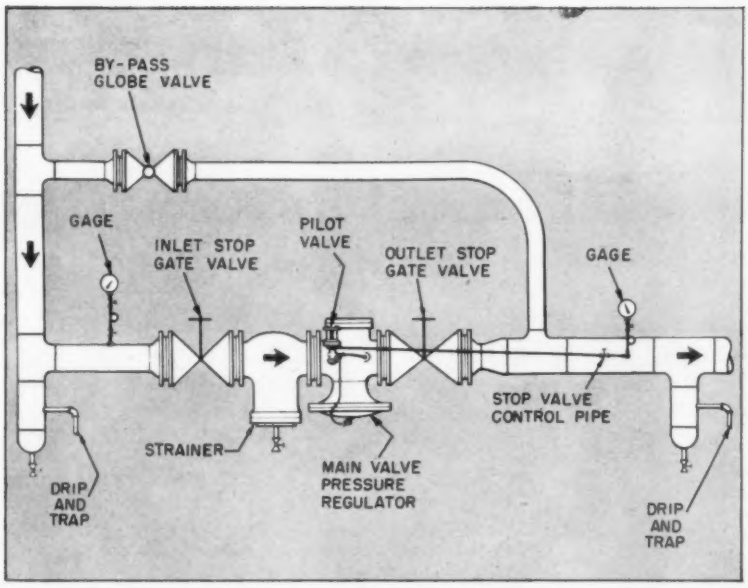


Fig. 3. Example of a pressure regulator valve station equipped with a bypass

a second regulator to cut in automatically, may be dictated.

If a momentary outage is permissible as is usually the case, a bypass will be sufficient insurance, when coupled with preventive maintenance work at intervals within the predicted service life. In some cases, where the predicted service life is long, two and a half to five years, and only minor inconvenience will result from a breakdown, it will be more economical to practice preventive maintenance. However, there may be preference to wait for failure and then repair.

General comments on the foregoing are in order. First, in estimating his plant's condition, an engineer is, quite naturally, apt to consider it favorably. But if judgments on the service to which a valve is subjected and the quality of the installation are not objective, an unrealistic service life will be predicted and breakdowns will come at unexpected times.

The questionnaire looks formidable, especially when thought of as only one of those needed to cover all the varied equipment in the plant. But many of the questions are analogous to those for other equipment. Also, any manufacturer will be glad to assist in formulating one for his own equipment.

When experience has shown that a regulator is not living up to expectations, the questionnaire can serve as a checklist in determining how the station can be improved. It serves as a check, too, in planning a new station that will cause minimum maintenance expense.

First few months after a new installation has been made constitute the period in which failure of a regulator or any other equipment is most likely to occur. In erection there is almost always some foreign matter, welding slag, burrs that work loose, pipe cuttings, introduced into the piping that is not entirely removed, even by thorough blowing-out.

In addition, the interior of new piping usually oxidizes and some of the oxide is carried off by the steam. This has the characteristic of coating surfaces in a regulator and when these surfaces are in the guides, sticking follows. In the first few months of operation, or at least after the first season of peak-load, such slag will be moved through the piping; the new piping will have developed a firm coating of oxide and the system will reach a stable condition.

What, then, is to be done in routine maintenance on a regulating valve. A short answer would be partial dismantling, inspection for and correction of deterioration from the three basic causes of failure—wear, fatigue and "dirt." The emphasis in routine maintenance should be placed on correcting dirt-caused deterioration and eliminating the dirt source.

In modern valve designs, wear and fatigue are actually minor problems. The points to watch are, naturally, those where sliding contact and deflection occurs. Stem guides should be checked for wear. Various designs have varying clearances. Don't replace just "on-a-hunch"—get the manufacturer's representative in the area to help determine allowable tolerances.

Fatigue failures are virtually nonexistent in regulators today. The exception usually involves chattering or other vibration not normal to regulators and needing correction.

Trouble Spots

Harmful "contamination" of a regulator is to be found:

1. In guides—causing the valve to stick.
2. In orifices — which could cause the regulator to fail either open or closed.
3. In passages or tubing connecting these orifices.
4. On seating surfaces of seats and discs—where it can prevent tight closure.
5. On cylinder walls of piston operated valves—where sticking can occur.

Sometimes the foreign matter is a collection of loose particles that can accumulate and cause trouble; sometimes it is in the form of a built-up coating. The former can be quickly blown clear. The latter must generally be removed with abrasives.

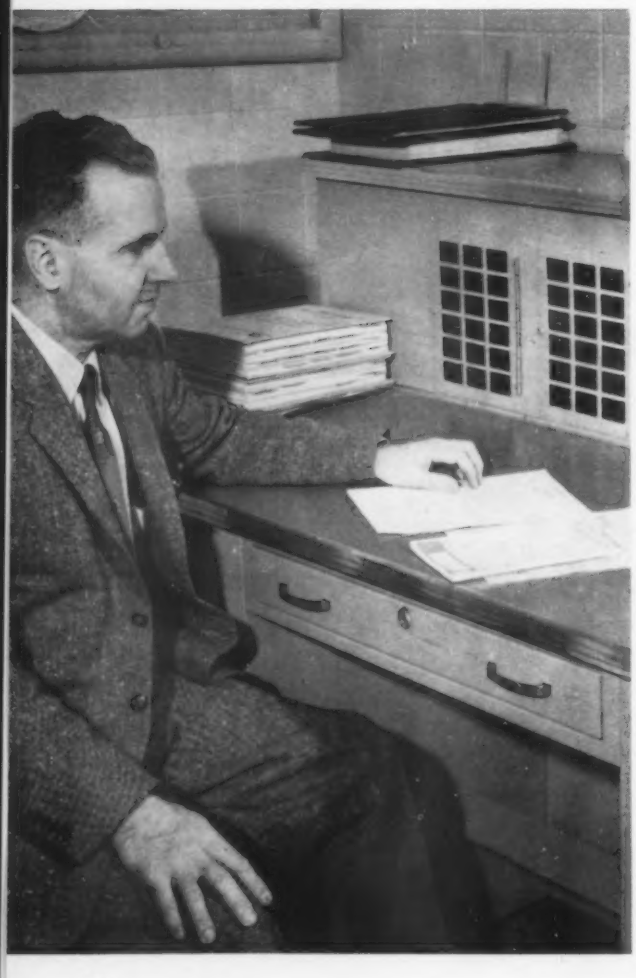
Here are some helpful precautions on valve maintenance:

1. Don't get rough with abrasives in cleaning—metal may be worn away, creating larger-than-allowable clearances or scratches that can cause sticking of themselves — or at least provide a better "anchor" for more dirt.
2. Don't try to re-use gaskets—on steam service they lose their "life" and will be less than satisfactory.
3. Don't worry about a tight dirt coating on the non-working parts.
4. Don't regrind a valve unless test shows it is leaking.
5. Don't regrind unless seat and disc are in good condition. A deep, wide seating surface is more likely to catch dirt.
6. Don't dismantle parts that are intended as permanent joints (except when actual replacement is needed) such as the seat ring-to-body, or travel-setting joints. It's valueless and usually causes trouble.

Ford's Electro-Mechanical System Spots

It takes a lot of equipment to run a modern medical clinic . . . Behind the scenes are big refrigeration machines, storage tanks, circuit breakers, an extensive pneumatic tube system . . . Article tells how supervisory system monitors operating irregularities

Fig. 1. Chf. Eng. L. V. Bedard beside supervisory console



REACHING 19 STORIES into the air, the Henry Ford Clinic is a relatively new addition to the skyline along West Grand Boulevard in Detroit. On the outside it may appear to be just another tall and modern building. On the inside it is a marvel of technical details and equipment. Critical items of this equipment along with certain parts of the fire protective system are watched closely. This job of patrolling is done by an electro-mechanical unit which is more aptly called a supervisory console.

This console has been designed to monitor as many as 90 potential trouble spots throughout the building. It is located in a room which also serves as the chief engineer's office. See Fig. 1. This arrangement gives the engineer the advantage of being informed of arising difficulties quickly and permits him to dispatch servicemen to a specific area of trouble with relatively little delay.

When trouble develops at any of the locations reached by the supervisory system, a light illuminates the appropriate marking in one of the 90 console windows. At the same time an audible alarm is sounded and is maintained until someone presses an alarm reset button. See Fig. 3. However, the visible signal remains illuminated on the board until the difficulty corrects itself or has been corrected by a building serviceman.

There are two basic electrical systems involved in the overall warning system. One of these pertains to circuits including the "trouble" contacts which have normally closed positions. The other system involves the warning lamp circuits and the audible alarm. In the lamp and audible alarm system contacts are normally open and are held in these positions by relay coils which are energized by current in the first system. Of course, when contacts in the first system open, signifying trouble, these coils are deenergized causing the contact points in the second system to close. Visible and audible signals result.

The outage of power normally supplied by the utility would put the alarm console and its electrical systems out of commission. For this reason, power affecting the operation of the warning system is taken from the building electrical supply lines that are wired for a possible emergency. Equipment has been installed which is designed to start a diesel generator automatically and quickly after normal power failure. This standby unit is expected to take care of emergency circuits.

Consideration has also been given to the consequences of defective bulbs in the console. Even if troubles were to develop, there would be no indications of their presence on the board. As a precaution against these possibilities, a normally closed, lamp-test button has been put to use. When depressed, it stimulates the occurrence of troubles in areas served by the entire board and as a result all the panel lights should become illuminated.

Among the critical items that the alarm set-up monitors are the humidity levels in all operating rooms. The danger here, of course, is the build-up of static charges of elec-

Troubles Fast

tricity. Inasmuch as dry air has insulating characteristics contributing to this phenomenon, its degree of wetness or humidity must be maintained above a certain level.

It may be well to point out that a factor of safety is employed in setting the alarm point for humidity. For example, if the humidity in any of the operating rooms should drop to the extent that a warning is registered on the trouble console, it can drop further before conditions become dangerous. This provision allows servicemen working time for corrective measures.

Among the advantages that this overall system provides are the following: It does a more thorough job of patrolling critical areas of operation than could be done with a limited number of maintenance personnel. It gives the servicemen time to correct undesirable conditions before they become serious. It takes a certain amount of guessing out of troubleshooting. It informs the chief engineer directly and specifically about troubles; this helps eliminate time lost in relaying information, inaccuracy of reporting.

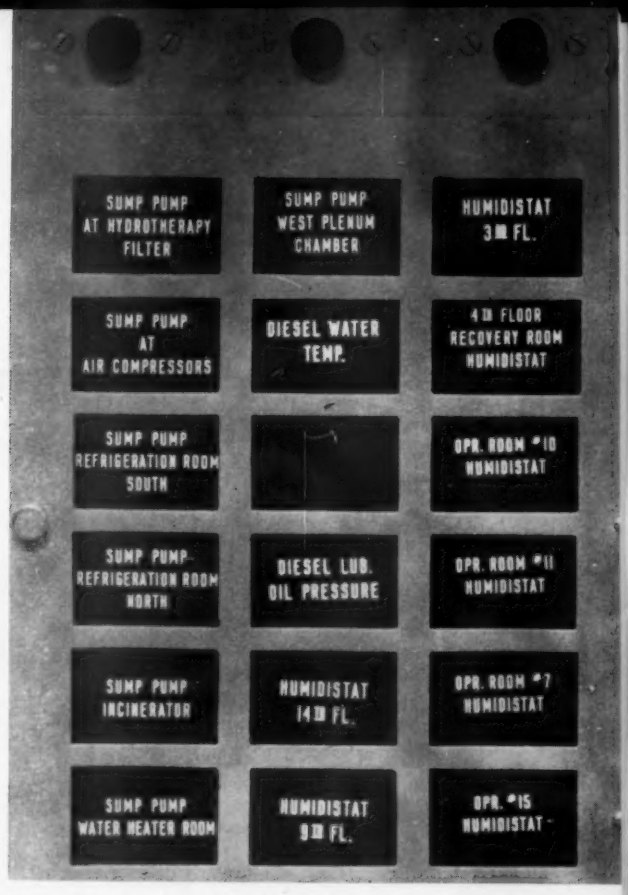

SUMP PUMP AT HYDROTHERAPY FILTER
SUMP PUMP WEST PLENUM CHAMBER
HUMIDISTAT 3RD FL.
SUMP PUMP AT AIR COMPRESSORS
DIESEL WATER TEMP.
4TH FLOOR RECOVERY ROOM HUMIDISTAT
SUMP PUMP REFRIGERATION ROOM SOUTH
OPR. ROOM #10 HUMIDISTAT
SUMP PUMP REFRIGERATION ROOM NORTH
DIESEL LUB. OIL PRESSURE
OPR. ROOM #11 HUMIDISTAT
SUMP PUMP INCINERATOR
HUMIDISTAT 14TH FL.
OPR. ROOM #7 HUMIDISTAT
SUMP PUMP WATER HEATER ROOM
HUMIDISTAT 9TH FL.
OPR. #15 HUMIDISTAT

Fig. 2. Close-up of center panel, note reset and test buttons

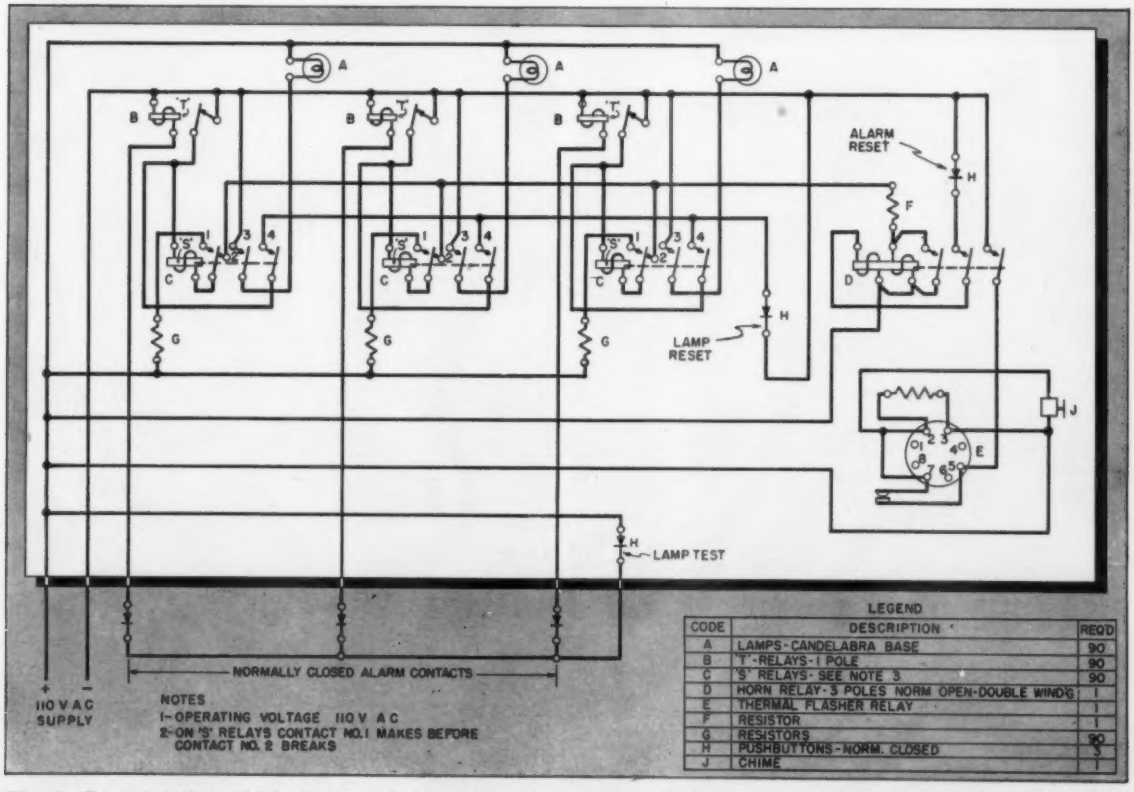

ALARM RESET
LAMP RESET
LAMP TEST
NORMALLY CLOSED ALARM CONTACTS
110 V A C SUPPLY
NOTES
1-OPERATING VOLTAGE 110 V A C
2-ON 'S' RELAYS CONTACT NO.1 MAKES BEFORE CONTACT NO. 2 BREAKS
LEGEND
CODE | DESCRIPTION | REQ'D
A | LAMPS-CANDELABRA BASE | 90
B | 'T'-RELAYS-1 POLE | 90
C | 'S' RELAYS-SEE NOTE 3 | 90
D | HORN RELAY-3 POLES NORM OPEN-DOUBLE WIND'G | 1
E | THERMAL FLASHER RELAY | 1
F | RESISTOR | 1
G | RESISTORS | 90
H | PUSHBUTTONS-NORM. CLOSED | 3
J | CHIME | 1

Fig. 3. Representative wiring diagram showing how relays are connected; note the two windings on horn relay "D"

Five-In-One Communications System

By D. R. BERNE, Manager, Sound Products
Radio Corporation of America, Camden, N.J.

Leeds and Northrup, a leading manufacturer of measuring instruments, electronic recorders and automatic control equipment, recently moved a portion of its operations to new suburban Philadelphia quarters. This new plant is a large, sprawling, single story structure comprising approximately 275,000 sq ft built in the pleasant setting of a Pennsylvania countryside.

Everything about this plant is new, modern—and very carefully planned. One of the well-engineered facilities installed in the plant is a centrally controlled communications system. This industrial sound system performs these five important functions: background music, dial code paging, fire and air raid alarms, public address, and time signals. The following article describes the functions of the system and describes the components used in its engineering.

IN PLANNING its new sound system, Leeds and Northrup engineers considered every factor and function and provided for nearly every contingency. Equipment requirements were carefully detailed and final selection of components was made on the basis of ability to meet rigid performance specifications.

Advance planning has paid off for L & N in these five ways:

1. Speaker locations were determined long before construction was completed and noise levels for various sections of the plant were closely estimated. Few changes had to be made when the sound equipment was placed in operation.

2. Amplifiers are accessible for servicing yet take up no floor space. Breakdown of one amplifier affects only the group of speakers it serves and will not disrupt service to any other area in the plant.

3. The sound system was extensively used during the moving operation and proved extremely helpful in locating roving supervisory and engineering personnel.

4. Many functions (music, code call, electronic siren, public address and time signals) are all handled on one circuit—at a substantial saving in wiring costs.

5. The system offers full flexibility to meet present needs and can be readily expanded by adding more line amplifiers, power amplifiers and speakers.

(Please turn to page 119)

Fig. 1. For the small enclosed areas with low noise levels wall mounted speakers like one shown at top of photo are used to provide adequate sound coverage for entire area

These are the Five Basic Functions-In-One System

1. Background Music

Background music to counteract work fatigue is played for approximately 10 minutes each half hour on an automatic basis by means of a Seeburg 200 industrial music library. The music is fed from the phonograph pick-up into a line amplifier and then distributed to 14 power amplifiers located throughout the plant. Music is reproduced over loudspeakers in all production areas, covering approximately 85 per cent of the plant. Background music is not played in office space or in the cafeteria.

2. Paging for Key Plant Personnel

Paging is accomplished by code call rather than voice. Key company personnel are assigned code designations which are tied into the phone system by means of a dial code machine. Code signals are sent over the entire sound system including the portion not covered by music by means of a tone generator which feeds into a second line amplifier. The code call repeats five times unless the phone is answered sooner. The person paged has only to dial a three digit number on any phone to be connected to the calling party.

3. Electronic Emergency Siren

An electronic siren for sounding fire or air raid alarm signals is controlled by a switch in the main guard location at the East Gate House which serves as a nerve center for emergency operations. Plant-wide public address is also available here.

4. Public Address Provisions

Plant-wide public address is not a primary function of the Leeds and Northrup industrial sound system, although the system is available for such use and carries a top priority rating during emergency operations. As indicated above, controls for the emergency PA function are located in the East Gate House where voice instructions can be issued to all locations in the plant.

In addition to emergency use, the public address system is arranged with a microphone pick-up in an executive office so that plant-wide addresses can be broadcast.

5. IBM Clock Signals

The sound system is tied in with the IBM master clock arrangement to signal the starting and stopping of work as well as the lunch periods. Signals are also fed into system through tone generator.

Fig. 2. Plant cafeteria is also used as an auditorium and meeting room with complete public address facilities. Speakers are mounted in ceiling baffles to eliminate cluttering

Fig. 3. Noisiest location in the plant is this screw machine section. Good sound coverage is provided here through a column-mounted cluster of high powered horns and drivers

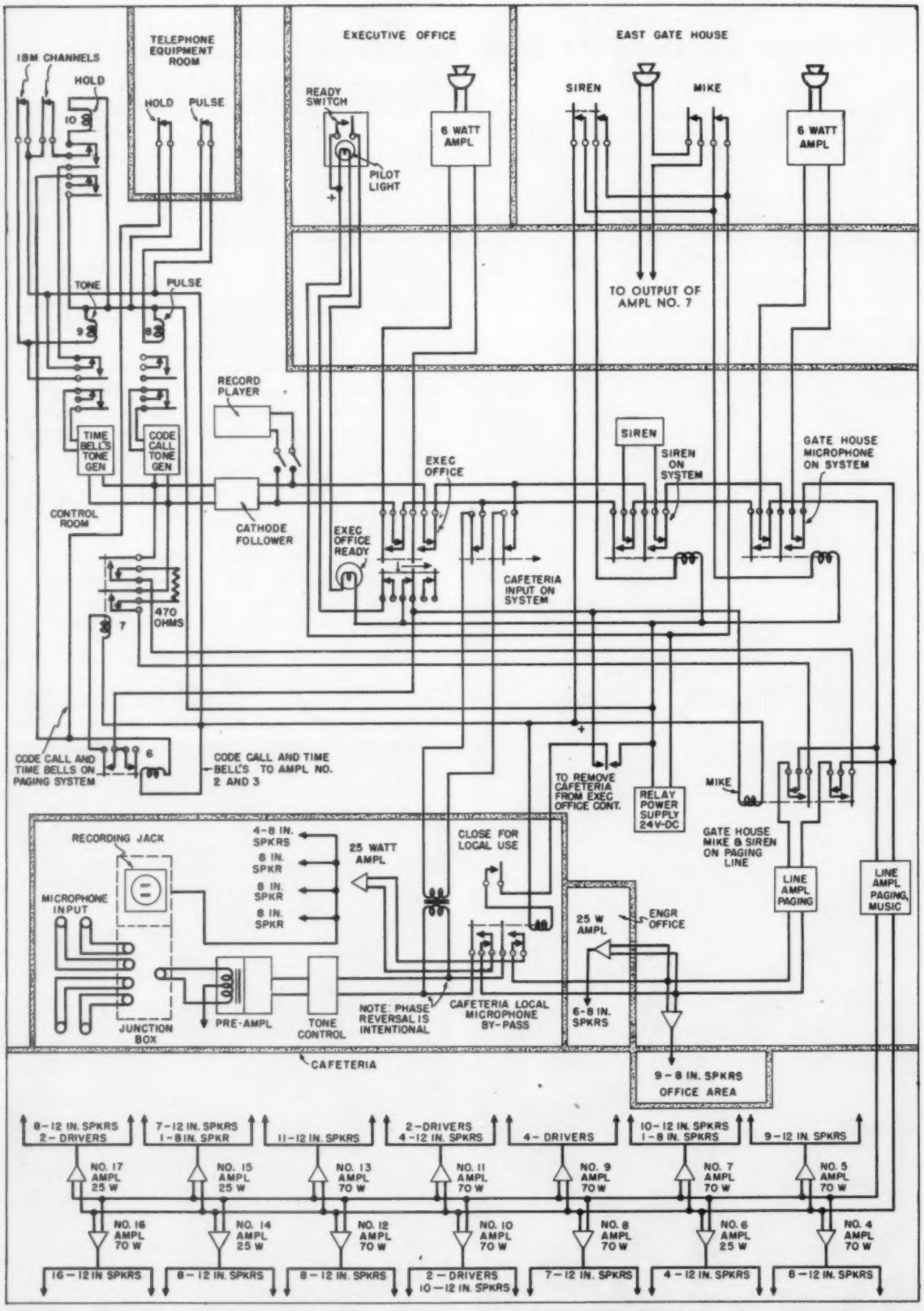


Fig. 4. Line diagram of control and audio circuits. Executive office is equipped with a microphone for making plant-wide addresses or special announcements by company officials. Music plays in the kitchen but not in cafeteria proper

An excellent feature designed into the 24-volt sound system is a priority rating for various sound functions. The sequence of the priorities is: 1. Top priority—voice messages from emergency headquarters at the East Gate House; 2. Electronic siren; 3. Public address from executive office; 4. Telephone code signals; 5. Background music.

The cafeteria also doubles as an auditorium. It is equipped with public address facilities which can be isolated from the plant sound system. Four microphone inputs provide required flexibility for all types of programs. High fidelity 8-in. loudspeakers inconspicuously mounted in ceiling baffles provide excellent, unusually smooth sound reproduction. Control of microphone outputs is accomplished with a mixer, and provision is made for tape recording meetings when required. Even this area is not immune from the emergency control in the East Gate House and any program can be interrupted.

Amplification in the RCA sound system is handled by 16 power amplifiers which are mounted in metal cabinets on columns at various locations throughout the plant. Amplifiers used include seven MI-12180, 25-watt units and ten 70-watt MI-12182 units Each amplifier serves a number of speakers, the quantity depending upon the noise level at the various locations. Noise levels vary widely, ranging from normal residential levels to a roaring 120 db in certain areas. Loudspeakers used throughout the plant are 12-in. industrial type with excellent frequency response characteristics.

In corridors, where acoustic tile is used on the ceiling, the sound system speakers are mounted completely out of sight above the tiling.

Noisiest location is the screw machine section. To serve this area, four large horns and drivers are mounted in a cluster, powered by one 70-watt amplifier. Provision is made for lowering sound output during lunch hour when machines are shut down.

The lacquer- and paint-spraying room is kept under positive pressure to minimize the entrance of dust. This noisy area is equipped with two horns with explosion-proof driver units.

Horns are also used to provide sound coverage for the receiving and shipping truck docks.

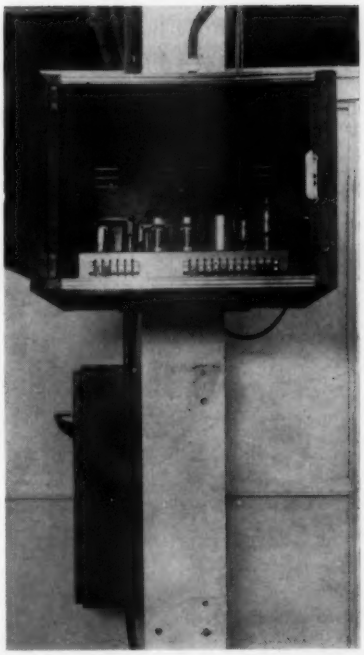
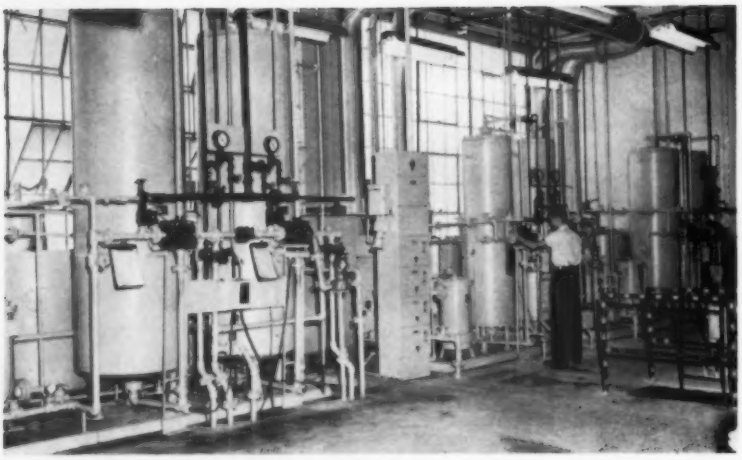


Fig. 5. Amplifiers for sound system are readily accessible for servicing yet take up no floor area. This is 70-w unit

Fig. 4. Control for all functions of the sound system at Leeds & Northrup plant are centered at the East Gate guard headquarters. Controls are on upper right of console

Fig. 6. Re-entrant type paging speakers carry sound to shipping and receiving platforms. Background music is played in all production areas or approximately 85 per cent of plant



The plating waste recovery system consists of three pairs of cation and anion exchange columns, one pair for each type of waste: chromium, acid copper, nickel

Waste Treatment Pays Its Way

Recovered Water Supplies Portion of Boiler Needs

TREATMENT of plating wastes by ion exchange is paying off in three ways for a major manufacturer of automotive hardware in eastern New Jersey. Not only does the company recover worthwhile quantities of plating metals and acids and solve the problem of discharging undesirable waste into public water-courses, but they are also able to recover practically all the water used for plating rinses.

In less than two years the company has recovered through ion exchange more than 16 million gal of water that would otherwise have gone to waste. The recovered water supplies 20 to 40 per cent of total boiler house requirements (depending on the season) which ordinarily would have to be purchased from the municipal water department. The recovered water is completely deionized and this, in turn, reduces the cost of chemical treatment of the boiler feed since the municipal supply has a 5-grain hardness. By recovering both the plating wastes and the water, the cost of waste treatment has been brought down to very nearly the break-even point.

The plant contains six automatic conveyors for plating copper, nickel and chromium on automotive hardware. Between each plating dip are the conventional water sprays and rinses to prevent drag-over between the successive tanks. Water sprays are automatically timed to operate only when the racks are within range.

Overflows from these rinse tanks, consisting of acid copper, nickel and chromium, trickle over weirs to a sump below each tank from where the wastes are pumped via 4-in. diameter collecting lines to individual holding tanks. The acid copper holding tank has a capacity of 15,000 gal, the nickel tank 20,000 gal and the chromium tank 30,000 gal. The copper and nickel tanks, as well as the delivery lines, are protected with a neoprene-type rubber lining. Concentrations of plating metals in the wastes average about as follows: acid copper (Cu) 750 ppm; nickel (Ni) 450 ppm; and chromium (CrO_3) 350 ppm.

Plating rinse wastes are combined with other rinses from the nickel and chromium acid dips, as well as with water from various heat exchangers.

Dilution Factor Increased

The dilution factor of the wastes is deliberately increased for two reasons. First, since the volume of rinse water is not great enough to permit the ion exchange recovery system to operate continuously, a large dilution factor is desired so that the system can operate as long as possible without shutdown. Ion exchange is more efficient when run continuously between regenerations, rather than intermittently. Second, since one of the objectives is to reclaim water as well as plating wastes, the more deionized water produced before an ion exchange system reaches its exhaustion point and requires regeneration, the more economical this part of the recovery process will be.

This plating waste recovery system, designed and installed by the American Water Softener Co. of Philadelphia, cooperating with Allis-Chalmers Manufacturing Co., consists of three pairs of cation and anion exchange columns, one pair for each type of waste. The cation exchange columns contain a strongly acidic resin; the anion exchange columns contain a strongly basic resin, both manufactured by the Rohm & Haas Co. of Philadelphia. Specifications and operating conditions for the system are listed in Table I.

Before entering the exchanger columns, the wastes are pumped through activated carbon beds for filtration and removal of organic impurities. Both the copper and nickel are recovered on the cation exchange columns which are operated on a hydrogen cycle. The acidic effluent from these cation exchange columns then pass to their respective anion exchange columns which adsorb the various anions in the wastes, primarily phosphates, sulfates and chlorides. In the case of the chromium wastes, the chromium is recovered on the anion exchange column and the cations present in those wastes are adsorbed by the cation exchange columns.

The effluent from the three sets of columns is, of course, deionized water. This is collected in a common header and pumped to the boiler house. About 600,000 gal of water a month are thus conserved, representing from 1/5 to 2/5 of the boiler feed requirements during the year. The boilers are medium pressure boilers operating at 200 psi.

Approach of the endpoints for the copper and nickel columns are indicated by a dropping pH on conductiv-

ity cells. Final cut-off point is determined by checking for calcium hardness in the effluent, since calcium ions break through before copper and nickel ions. The rinse waters contain some hardness because city water is used without pretreatment. Final endpoint is 8 ppm as $CaCO_3$. However the water quality during 90 per cent of the run is zero hardness so that the average hardness of the water delivered to the boiler house does not exceed 1 to 2 ppm. The endpoint for the chromium recovery system is determined by analysis for chromate or a maximum of 15 ppm of sulfate in the anion effluent.

When these endpoints are reached, the adsorbed metals are recovered by regenerating the columns. Data on the regeneration cycles are given in Table II.

The eluted liquor from the copper-adsorbing column, which is regenerated with sulfuric acid, is copper sulfate. Since acid copper electroplating solutions tend to develop an excess concentration of copper sulfate, the regenerated copper sulfate has little economic value. However, this same plating solution normally requires daily additions of sulfuric acid. Therefore the copper sulfate-sulfuric acid solution, produced by regenerating the strongly acidic resin bed, is returned to the electroplating solution in lieu of the normal acid additions, so that some economic advantage is derived.

Nickel, which is reclaimed as nickel sulfate by regeneration with sulfuric acid, is returned to the plating conveyors. Prior to this, however, the excess acidity is neutralized by adding nickel carbonate until the required pH of 2.6 to 3.0 is reached. Recycling the nickel solution back to the plating tank not only permits direct reuse of the nickel, but also reduces the quantity of water that would ordinarily be added daily to maintain proper concentrations of the plating solution. About five pounds of nickel carbonate per 100 gal are required to neutralize the regenerated nickel solution. Aside from this, no nickel salts have been purchased in two years for one of the plating tanks, since enough nickel is recovered to maintain the required nickel concentration.

The chromium is recovered from the anion exchange column by regeneration with NaOH, producing a sodium chromate solution. The chromate is recovered as a precipitate of barium chromate by the addition of $Ba(OH)_2$. The decision to precipitate the chromium rather than convert it to chromic acid was made in order to recover the sodium hydroxide for reuse in the next regeneration cycle, since the cost of the caustic soda outweighs the value of the chromic acid that could be recovered. In addition, the barium chromate does have a market value.

Calcium adsorbed from the rinse waters by the cation exchange resins precipitates as calcium sulfate during regeneration with sulfuric acid. This precipitate is removed by filtration before the liquor is returned to the plating conveyor. Since the sodium hydroxide passed during regeneration from the anion exchange columns in the copper and nickel recovery units is combined with a variety of anions, the caustic cannot be recovered economically and is therefore discharged to the sewer.

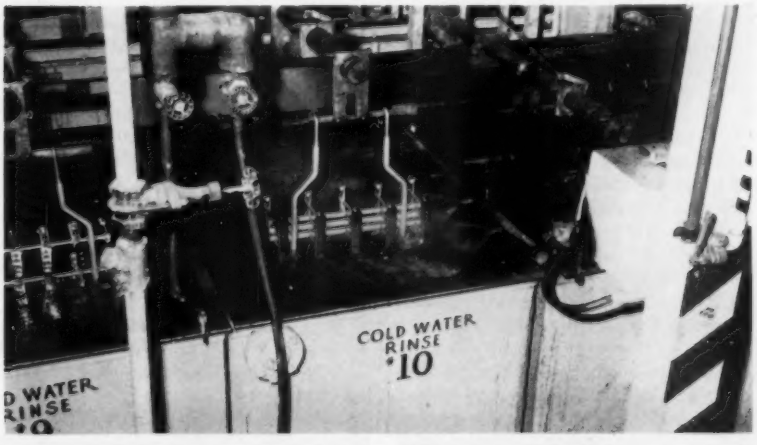
Summarizing the results obtained with this plating waste recovery system, in the first 6 months of 1956 the manufacturer has recovered a monthly average of 2000 lb of nickel sulfate (dry weight), 500 lb of copper sulfate, 500 lb of 66 deg Baumé sulfuric acid and 15,000 lb of barium chromate.

Table I. Specifications and operating conditions of waste recovery system

	CHROMIUM		ACID COPPER		NICKEL	
	Cation	Anion	Cation	Anion	Cation	Anion
Metal concentration in waste	350 ppm (CrO_3)		750 ppm (Cu^{++})		450 ppm (Ni^{++})	
Bed size, cu ft	20	20	12	12	6	6
Bed diameter, in.	36	36	30	30	24	24
Flow rate, gpm	40	40	30	30	15	15
Metal recovery, oz/cu ft	—	36 (CrO_3)	12 (Cu)	—	18 (Ni)	—
Total through-put, gal	16,000	16,000	1,500	1,500	2,000	2,000

Table II. Data on regeneration cycles for chromium, acid copper and nickel

	CHROMIUM		ACID COPPER		NICKEL	
	Cation	Anion	Cation	Anion	Cation	Anion
Regenerant, at 10% concentration	H_2SO_4	NaOH	H_2SO_4	NaOH	H_2SO_4	NaOH
Regenerant, lb/cu ft resin	10	12	10	12	10	12
Regenerant flow rate, gpm	10	10	6	6	3	3
Regenerant cycle, min	120	120	75	85	52	55
Backwash, gal/unit	350	350	250	250	100	100
Rinse, gal/unit	700	700	300	300	200	200



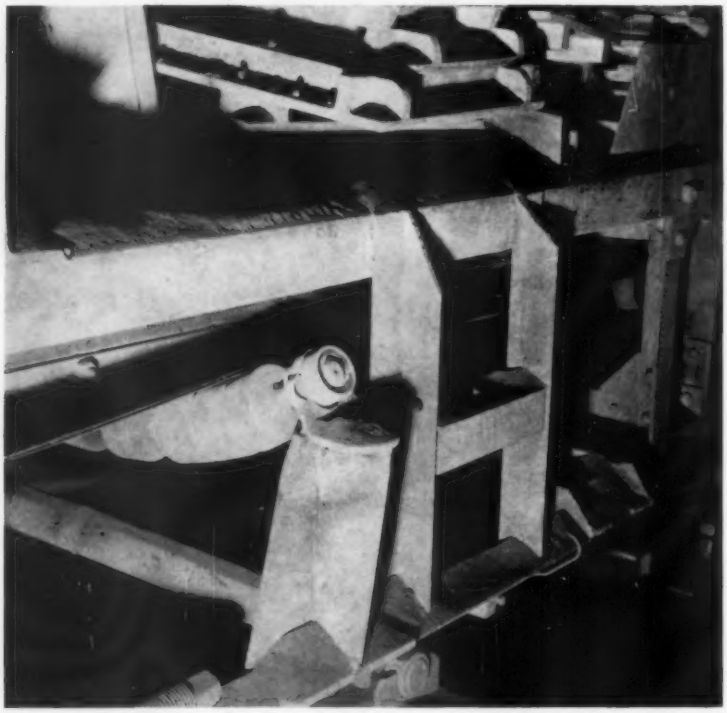
Automatic water sprays begin operating as plating rack starts to emerge from bath

60 Per Cent Water Recovery

In addition to conserving plating metals and acid, the plant is presently recovering 25 per cent of the water used in its plating operations. When present plans for connecting other plating equipment to the waste treatment system are carried out, more than 60 per cent of the water will be recovered. Plans also call for reclaiming the contaminated water from other processes such as the automatic washers ahead of the plating line and the spray rinses ahead of the paint booths.

This Idler Works Hard

Cuts Maintenance and Belt Costs, Ups Production



Four years' service was predicted by Bendix maintenance men for this idler

"WE HAVEN'T replaced a conveyor belt on the molding line in our foundry since 1954, and the way things look now we won't have to make a replacement for at least another two years." So said Charles Palen, millwright foreman at the South Bend, Ind., plant of the Bendix Aviation Corp.

"This belt installation," Mr. Palen continued, "was made early in 1954, and the conveyor line hasn't had an accidental stoppage since."

The installation he describes is a conveyor system for carrying spill-over sand away from the molding line. Prior to 1954 the system had meant trouble to Department 22 of Plant 21, the department charged with maintenance and construction for this plant.

In the old installation, foundry sand spilling over from the belt frequently lodged in steel belt idlers. Despite regular inspection and lubrication tours —Palen's department used to make four tours daily—sooner or later sand would work its way into bearings and the idler rollers would freeze up. That's how the trouble started.

The belt travelling across the immobile idler soon wore through steel. This action created a sharp edge which sliced the belt like a wielded razor. Too many cuts and the belt had to be replaced. This, of course, meant down time and an idle foundry operation.

Even when maintenance inspectors were fortunate enough to detect a frozen steel idler before it cut a belt, it meant trouble for the foundry. To replace a single inoperative idler meant shutting down the line, too, for at least a half-day.

Shut-downs, always time-consuming, really weren't as costly as the rather involved maintenance and lubrication tours. In man-hours, these tours accounted for even more time than repairing belts and replacing idlers. But until 1954, Bendix had no way of solving this problem. Handling sand this way was certainly essential to foundry operation, even though there was virtually no way of keeping the material from fouling up steel idlers.

Then, Mr. Palen and Cecil Bratcher, who is general foreman of the entire department, discovered a new way of handling the conveyor system in the foundry. They changed the entire system of idler rollers.

During one week-end they removed each steel idler and substituted a flexible, single roll belt conveyor idler suspended from a bearing at each end to form a natural catenary. A neoprene or rubber covered wire rope, it has swaged steel shank ends. These shafts fit into the inner race of sealed, double-row, precision ball bearings. Neoprene or rubber discs are molded to the covered steel cable. The shank ends are locked in place in the bearings by a snap ring which fits into a recess in the inner race.

In the two years they have been operating, none of the new idlers, called Limberollers, have had to be replaced. "Our inspection and lubrication tours have been discontinued," Mr. Palen added. "The new idlers have sealed in bearings which require no lubricating after they have been installed. As for inspection, we stopped that shortly after we put these idlers under the belt. It was apparent we were looking for stoppages which wouldn't occur."

61-D

Fig. 1. Administration office is air conditioned through use of secondary ducts and small tubes leading to ceiling fixtures mounted on interchangeable blocks

Air Conditioning at Martin

Variety of Systems Provides Comfort in Offices and Special Areas

By M. B. KNOLL, Supervisor, Plant Engineering, Glenn L. Martin Co., Baltimore, Md.

COMFORT, from the point of view of worker efficiency at Martin, is a prime consideration. For this reason, air conditioning for comfort cooling is found in the major portion of the office spaces as well as in certain special areas, such as the computer section and the die storage section where the equipment requires specific temperature and humidity control. The total air conditioning load throughout the plant is estimated at 2706 tons.

At present there are several types of air conditioning equipment being used in the plant. In those buildings containing primarily office spaces, permanent centrifugal conditioning systems are used. These units are designed to maintain a constant temperature level of 75 F and a relative humidity of 50 per cent to 55 per cent when the outside temperature reaches 95 F.

In some office areas, particularly in the older and smaller offices, air conditioning units up to 20 years old are still in operation. These older systems were designed to maintain a temperature of 80 F with no humidity control. Such a condition today is suitable for a transient area, but in an office where a large number of people work an eight-hour day, 80 F is considered too warm and uncomfortable, the majority of employees demanding a 75 F temperature.

However, these older air conditioning units are gradually being replaced under the continuing five year replacement plan, which has been instituted to replace wornout or inefficient equipment at the appropriate time.

Chilled Water Systems

Most of the replacement units are chilled water systems, designed for comfort cooling and operating most efficiently and economically in large office spaces requiring from 100 to 500 tons capacity of air conditioning equipment. The change from the reciprocating compressor type of machine to the chilled water system was made because of the latter system's flexibility as well as its ability to adjust to the load and to operate from 100 per cent capacity down to 10 per cent, an adjustment impossible with the older units. Furthermore, as the load decreases, the electrical demand decreases proportionately.

With this advantage and with less maintenance required on this type of system, operating expenses, a factor of major importance considering the total tonnage involved, is reduced. This system, moreover, is used most advantageously in accommodating slow fluctuations and gradual changes in cooling.

On the other hand, the chilled water system cannot be used, because of a gradual leveling factor in its design, to effect large or sudden changes in temperature. Nor can it be used to cool environmental test equipment, where temperatures descend to the sub-zero level. For this specialized work we use direct expansion systems capable of handling rapid load changes, altering the air temperature in a matter of seconds.

Package units are used to air condition the office spaces which occupy a part of the manufacturing building. Since these areas are liable to reconversion into shop space at any time, easily removable or portable air conditioning units are the most desirable and economical. These machines are relatively simple to set up or dismantle, and are delivered in complete operating units from the factory.

It is well known that air in motion

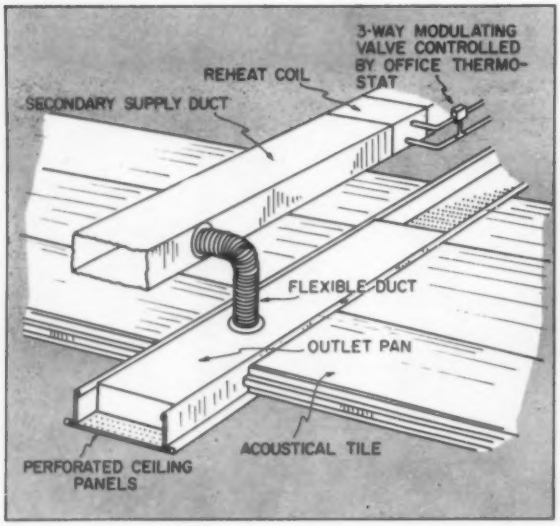


Fig. 2. Plan shows detail of air outlets for general office area

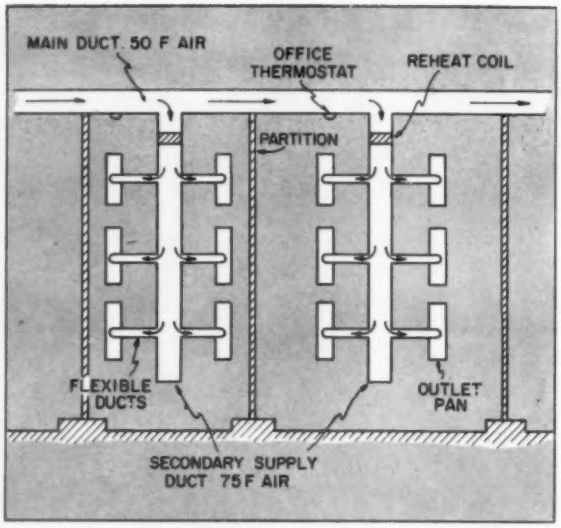


Fig. 3. Plan of air conditioning system for executive offices

causes a sensation of freshness, while still air has a depressive effect. Comfort cooling systems in the plant feature a five to 10 fpm distribution velocity. In order to maintain a desirable ventilation, air is pumped out of the space, filtered and forced through cooling coils where the moisture is condensed out. This air is then cooled and finally returned to the area. In winter, the air is forced through heating coils, warming it to the desired temperature. The majority of our air conditioning systems return 80 per cent of the space air mixed with 20 per cent outside air, although in some of the newer installations a 75 per cent—25 per cent ratio is maintained.

Future installations will include three new centrifugal water-chilling units, planned for operation this year. These units will replace the older machines now serving the engineering laboratory building and executive offices, the cafeteria and the administration building.

Care of Cooling Towers

Induced draft cooling towers are used for cooling water from the system. During the winter, when the outside air temperature falls below 40 F, the water is prevented from freezing by maintaining constant circulation and by injecting live steam into the pan. In so doing, a false load is placed on the cooling tower, thereby maintaining water temperatures above freezing.

Twice each year the cooling towers are cleaned and hosed, and the accumulation of slime and algae on the pan and pipes is chemically removed. Insects, clogging the screen protecting the water outlet in the pan, and algae growth in the water, present the greatest problems to the cooling tower efficiency.

The preventive maintenance program in other air conditioning equipment is continuous, all equipment being checked and replaced periodically. Realizing that to change a fan belt only when it is worn out or disabled is false economy, all belts are changed regularly to insure against unexpected stoppage of equipment.

One of the main control problems in air conditioning is that of fluctuating loads caused when an area has more or less personnel in it than the air conditioning system is designed to handle. In these areas a temperature level several degrees above the set level may quite often be maintained, thus operating the equipment over its designed maximum output. While an air conditioner cannot be overloaded, nevertheless it operates with maximum effort up to its capacity. When the temperature level is raised above that set level, the unit attempts to maintain the specified temperature but the result is often inefficient.

On the other hand, air conditioning machines have greater difficulty with low loads, since all units operate continuously and run at capacity only. Unlike window units in the home, they should not switch off and on. Such operation would create a major control problem, since the humidity is under control only when the machine is running.

The older equipment in our plant, operated by reciprocating compressors, presents an adjustment problem. These units run at full capacity only and do not adjust to fluctuating loads, although a hot gas by-pass has been incorporated in these older units in an attempt to handle these loads. This make-shift arrangement controls capacity by forcing a portion of the hot refrigerant gas to recirculate within the machine without cooling.

The human problem, however, is the greatest problem. "You can't please all of the people all of the time" is a maxim highly applicable to air conditioning systems. The ideal goal is to maintain 100 per cent personnel comfort but, due to human factors involved, a true realization of the goal is unattainable. While not apparent to those persons concerned, we believe that 90 per cent of their discomfort is purely psychological.

All in the Mind?

Mental suggestion and imagination play a major role in the discomfort of personnel. Consider two adjoining offices: one is well lighted with plenty of windows and brightly painted walls; the other is dully painted, windowless and with poor lighting. In this latter office the employees complain constantly that their room is chilly, but that the adjoining office is ideally comfortable. When a maintenance man checked the situation, he found temperatures of 76 F in both rooms. The well-lighted office merely seemed warmer because of its cheery and attractive surroundings where, undoubtedly, the personnel worked more efficiently.

One of the tricks of our plant engineer's trade is the fixed thermometer, a subtle gadget with a column of mercury immovably set at 74 F. Answering a complaint from an office where the temperature is said to be too high or too low, the engineer shakes his thermometer vigorously, as though he were a doctor preparting to take a

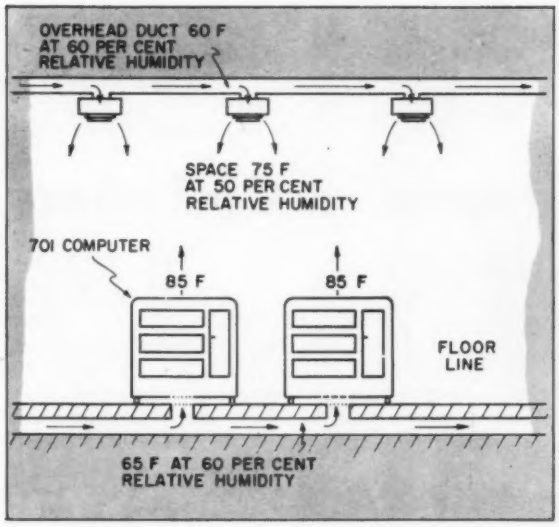


Fig. 4. Conditioning system for computer is highly sensitive

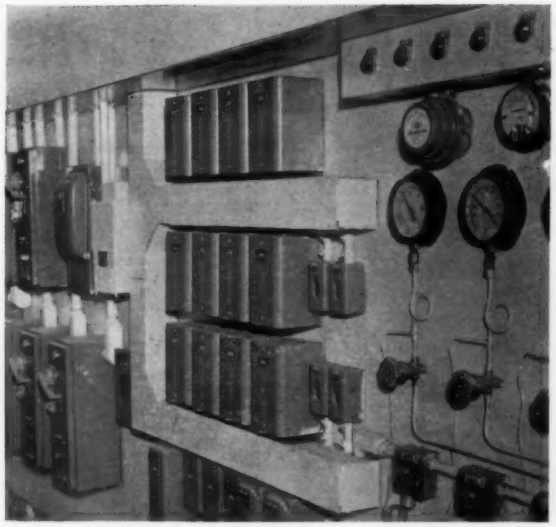


Fig. 5. Instrument panel of computer air conditioning system

patient's temperature. Placing the thermometer in a conspicuous position, he advises the occupants to let it stand for a while. When the reading is taken, it naturally is 74 F and complaints are quieted.

The Ideal System

Our new executive offices are designed to incorporate the latest type air conditioning system and are considered ideal in temperature and humidity. The building area and system feature a 100 per cent flexible installation by which the personnel of each office can thermostatically select a desired temperature from 75 F to 80 F in both summer and winter.

Each office, regardless of partitioning, is separately controlled, an operation accomplished by a main duct, carrying 50 F air, fanning out to secondary ducts at regularly spaced intervals and then through small tubes to ceiling fixtures. These fixtures are mounted in interchangeable ceiling blocks, in a regular pattern with the lighting fixtures, making possible the air conditioning of an area despite the location of partitions. The air flows downward from the ceiling fixtures, displacing the warm air and creating a fresh atmosphere. Small heaters at the entrance to each secondary duct warm the air to the temperature designated by the thermostatic control in each office.

During the winter the main duct carries 65 F to 70 F air, the entire system being adjustable to the worst weather conditions. Supplementing the air conditioning system is a small radiator at each window base to heat the cool air around the window. With such a system in operation it is possible to maintain a controlled temperature and humidity throughout the year with no more than a half degree of temperature fluctuation.

Precise control of temperature and humidity is required in the computer section, since this complex and sensitive electronic brain generates considerable heat and, operating on the principle of static electrical charges, requires exact temperature and humidity control. Relative humidity in the computer components must not fall below 40 per cent nor rise above 60 per cent. If the humidity oversteps these prescribed limits, the machine's sensitivity is affected and incorrect computations may result. An elaborate alarm system, therefore, has been designed to warn the operator whenever the computer's humidity is either above or below the designated percentages.

Alarm System

This alarm system for the computer operates a bell alarm as well as a large panel of red lights which pinpoint the affected area for rapid troubleshooting. The alarm for inadequate air flow is operated by a series of aluminum blades at appropriate locations in the ducts. When the alarm sounds, a specific light comes on indicating too low or too high humidity, a temperature too high or too low, or inadequate air flow in any part of the system. The red panel light remains on until the technician corrects the difficulty and resets the switch in the trouble area.

The computer is in use night and day throughout the year, necessitating dependable air conditioning to maintain a continuous reliability in its computations. Conditioned air is piped through ducts at the base of the components at a temperature of 65 F and a humidity of 60 per cent. Due to the tremendous amount of heat generated, the air emerges from the top of each unit at 85 F, which is immediately cooled to 75 F at 50 per cent relative humidity by an overhead system.

Since one ton of refrigeration is the equivalent of the amount of heat required to melt one ton of ice in twenty-four hours, the fifty ton equipment, which is the basis of the two-duct, two-unit system and which conditions air for the computer, performs the equivalent of melting 50 tons of ice in one day. The dual air conditioning system designed to serve a new computer machine, which is currently being installed, is identical in type, capacity and operation to that which now serves our present computer.

Air conditioning is able to provide widely varying atmospheric conditions, and can maintain any atmospheric conditions regardless of variations in outdoor weather. However, hard and fast rules that will apply to all conditions and to all people cannot be given. The best that can be done is to approximate those conditions under which a majority of the occupants of a room will feel comfortable and this is what we attempt at Martin.

Fluid Power Maintenance

VII. Maintaining Hydraulic Cylinders

By H. L. STEWART and J. M. MORITZ, Logansport Machine Co., Inc.

HYDRAULIC CYLINDERS are one of the two means of motivation produced in a hydraulic system. The second means is the hydraulic motor. Hydraulic cylinders are designed to produce straight line and angular motions such as pushing, pulling, lifting, clamping, forcing, tilting, etc. Hydraulic cylinders may be double-acting, i.e. oil pressure is required to move the cylinder piston in either direction; single acting with gravity return which requires force to move the piston in one direction and a dead weight, such as a platen or die, to return the piston to the original starting point; and single action spring return in which oil forces the piston in one direction and the spring returns it.

Cylinders may be of the rotating or non-rotating type. The latter has the most applications. Rotating types are used where there is a need for a cylinder on a rotating spindle. Here the oil is fed to the cylinder from a stationary distributor housing through a rotating distributor shaft.

A misconception often held by the user regarding non-rotating cylinders is that the piston rod is not free to rotate. While the rod may rotate only a few degrees it may be enough to cause trouble. Since the use of internal guides is not generally recommended, especially on long stroke cylinders, external supports can be used to keep the rod from rotating. Figure 1 shows a recommended guide.

A recent development in cylinder construction has been the introduction of the elliptical piston rod which keeps the piston from rotating.

Cylinders range from the "throw-away" type which are designed for only a short life and which are cheaper to replace than to repair, to those which cost many thousands of dollars and which are designed to give many years of satisfactory service under adverse conditions. Operating pressures of cylinders range from 100 psi to as much as 10,000 psi. Cataloged cylinders rarely exceed 3000 psi.

Seals in General Use

In the lower operating level of 100 to 250 psi, cup packings, as shown in Fig. 2, are often used as piston seals. In the medium operating range, 250 to 1500 psi, the automotive type piston ring, shown in Fig. 3, (as many as four to a piston) seems to be the favorite seal. O rings or Quad rings, Fig. 4, are often used along with the automotive rings to assure a better seal during the "break-in" period.

Several types of synthetic seals also find considerable use in this operating range. In the upper operating range, from 1500 psi and up, the chevron or V type packing, shown in Fig. 5, is commonly used. These are of a synthetic material or of impregnated leather. Impregnated leather cups are also used in this operating range.

An advantage of the pistons with non-metallic seals is that there is no metal to metal contact between the piston and the cylinder tube. One disadvantage is that more friction is created with multi-lip type seals.

In order to pack the rod of a double-acting cylinder a number of different kinds of packings are used. They may be broken down into two categories —adjustable and non-adjustable types. The adjustable type can be "taken up" when wear occurs in order to extend the life of the seals. Under this category are the chevron, V ring, C ring, wick type, etc. The non-adjustable must be replaced when it wears to the point that the oil leaks out of the rod bushing. These seals consist of O rings, Quad rings, V cup, hot packing, and other single-line contact packing and also cartridge type seals.

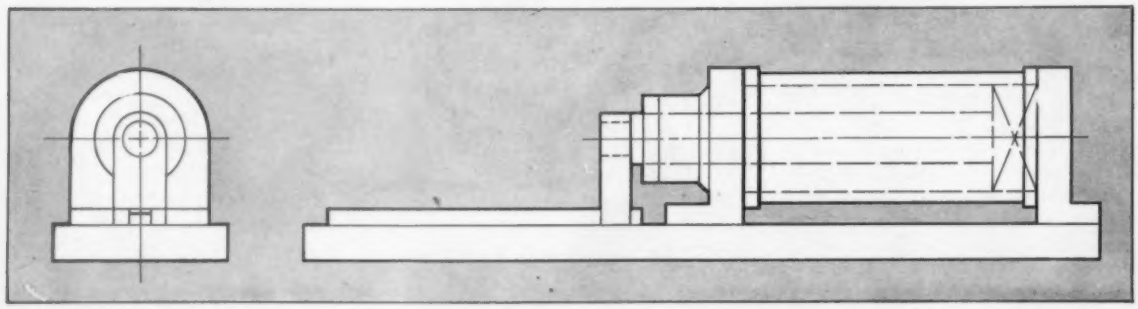
One disadvantage of the adjustable packing is that too often installers and maintenance personnel "pull up" on the packing gland and jam the packing to such an extent that it will not serve its purpose. Multi-lip packings should be installed so that each lip acts as a separate seal.

To overcome the jamming, cylinder manufacturers often shim the packing gland so that it can be tightened to a point where only a slight amount of pressure can be placed upon the set of packing. As the packing wears part of the shim stock can be removed and the packing gland pulled up closer to the cover.

If a fire-resistant fluid is to be used in the cylinder, caution must be used in selection of packing. Most synthetic packings are attacked by fire-resistant oil, causing a swelling action.

Piston rods of hydraulic cylinders are usually made of ground and polished cold rolled steel. Some are hardened and some are chrome plated. In applications where considerable moisture is present stainless steel is often used. Piston rod diameters fall under

Fig. 1. External supports prevent rotation of piston rod. Internal guides are not recommended on long stroke cylinders



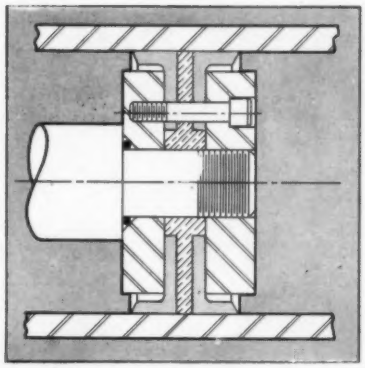


Fig. 2. Cup packings are often used as seals for lower operating pressures

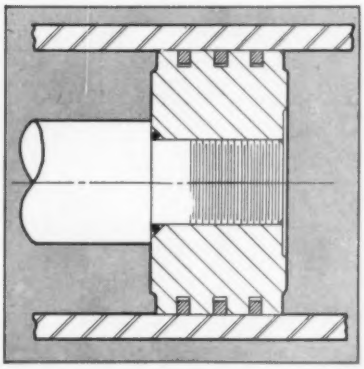


Fig. 3. In medium operating range, automotive type piston ring is popular

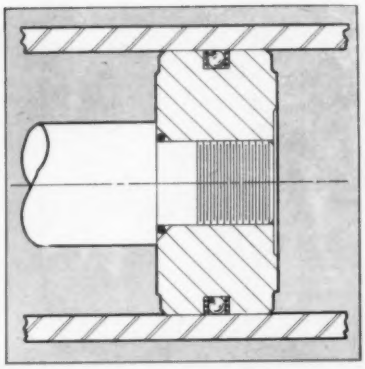


Fig. 4. Combination of automotive and O rings make good break-in period seal

two classifications—the standard size rod and the two-to-one rods. The latter designation indicates that the area of the piston rod is half the area of the bore of the cylinder and is used where extra stability is required or where a rapid return of the piston is needed.

Cylinder tubes are constructed of honed seamless steel tubing, honed centrifugal cast iron or cast steel tubing, cold drawn aluminum tubing, a honed forged steel tube, or from a sand casting made of steel or cast iron.

Cylinder covers are generally fastened to the cylinder tube by screws tapped into the tube, or by tie rods. In the "throw-away" type cylinders the covers are usually welded to the tube which makes them very difficult to disassemble.

A question which often arises is, "What is the biggest single cause of hydraulic cylinder failure?" We can come back to the one thing that causes other components of the hydraulic system to fail—dirt. Dirt or foreign matter, such as pipe shavings and pipe scale, can quickly ruin the cylinder bore and the piston.

Remember, when a piston with metallic rings is used in a cylinder there are only a few thousandths of an inch clearance between the piston and the cylinder bore, and any foreign matter can quickly score the tube and piston. The piston then begins to "pick up" the metal of the tube; the piston rings become jammed and then break, resulting in serious damage to both the cylinder tube and the piston.

Often when dirt or foreign matter causes a cylinder to malfunction it can be detected in time so that the tube can be salvaged. For example, if a cylinder that has been performing satisfactorily begins to show signs of sluggishness, loss of power, and erratic movement of the piston rod, it is a sign that the tube is being scored. The cylinder should be stopped immediately. By honing the tube to a diameter which will remove all scores, and making an oversized piston to fit the finished tube, the cylinder can be saved.

Welding of deep scored sections is not recommended as the heat is likely to distort the tube badly.

In repairing the cylinder tube it has been found that by producing a 20 to 30 microinch finish on the bore when using a metal piston with metal piston ring, the leakage by the piston will be held to a minimum. If synthetic packings are used on the piston the finish should be somewhere around five microinch if long packing life is to be expected.

Wrong Installation a Factor

Another major cause of cylinder failure is misalignment or eccentric loading. Misalignment is caused from improper installation of the rod guide. Eccentric loading can be overcome by the use of proper cylinder design such as the use of spacers, sufficient size rod, long piston and long rod bushings and external guides.

Misalignment or eccentric loading causes excessive wear on the rod packing, rod bearing and on the piston.

Scored piston rods may be salvaged by polishing or grinding providing the scored sections are not too deep. The rods can then be chrome plated in order to bring their dimensions up to the original size. If small sized rods are badly scored, it may be more economical to replace them than it would to salvage them.

Rod bearings, usually made of a good bearing bronze, should be replaced when they become worn. Since these bushings are usually press fitted into the cylinder cover, it is generally better to machine a new bushing out of bar bearing bronze rather than to order a new stock bushing since any wear on the piston rod will still allow for too much clearance between the rod and a new stock bushing. This is also true where cushions are involved. The bushings should be made to fit the particular part in question. The clearance between the cushion bushing should be from 0.001 in. on small sizes to 0.002 in. on the large sizes.

Misalignment or eccentric loading failure is rather easy to detect as either one will cause more wear on one portion of a rod, packing, or piston, than on the other portions.

Another cause of cylinder failure is heat. While heat may not damage the metal parts of the cylinder, it has a definite bearing on the life of the packings and gaskets. Heat will harden many of the synthetic seals to a point that excessive leakage will develop, thus greatly reducing the efficiency of the cylinder performance. High temperature packings are ofter used but even these are only suitable for around 500 F. If the external temperature is above point, some type of barrier should be mounted around the cylinder to protect it from this intense heat.

Most external leakage develops around the piston rod. If creating more tension on the packing does not overcome the leak, then the rod packing should be changed.

While it is not a great task to change rod packing, it must be done with care. Provisions must be made to protect the sealing surfaces from cuts on sharp corners of the stuffing box or piston rod. Extra caution must be used when passing the seal over a threaded portion of the rod which is the same nominal outside diameter as the inside diameter of the packing. A suggested method of insuring against cutting of the packing is to use a wax or an extra heavy grease on the threads. This provides lubrication and also keeps the seal from dropping into the threads. The substance can be washed off the threads with a solvent after the packing is put in place.

On multi-lip seals such as V rings and chevrons, each adapter ring and packing ring should be put in one at

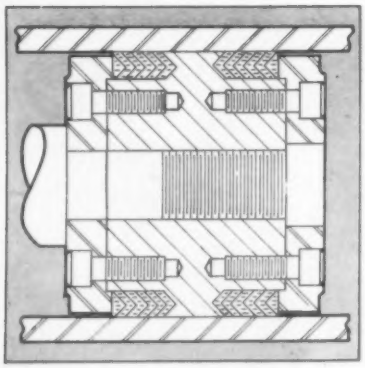


Fig. 5. Chevron or V packing is in common use for operating above 1500 psi

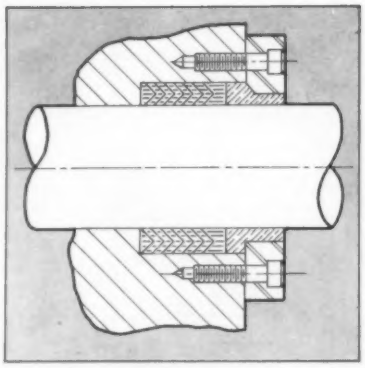


Fig. 6. Blunt-nosed, non-metallic tool should be used for V-ring installation

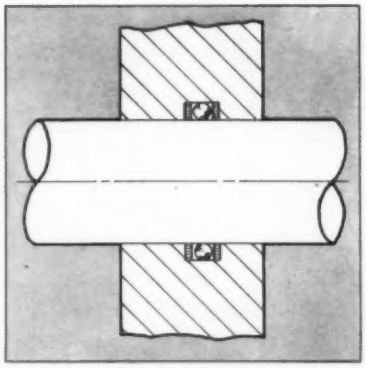


Fig. 7. O rings prevent piston cutting packing when cylinder is reassembled

a time rather than to try to jam the packing into the stuffing box as a set. Always make certain that the packing is assembled so that the packing rings are sealing in the right direction. Always install the sealing lip toward the pressure.

In installing a set of V rings, first place the male adapter ring into the stuffing box and make certain that it is properly seated. Next, install each separate V ring. It is suggested that a small amount of light grease be wiped on each ring. Never use a screwdriver or a pointed tool to force the rings into place. A blunt nosed non-metallic tool such as a piece of hardwood does a good job.

After each ring is in place, install the female adapter ring and then the packing gland. When tightening the packing gland make certain that it is pulled down evenly. The packing gland should be pulled down only to such a point that it touches the packing. Shims should be placed under the packing gland screws so that the packings cannot be jammed. If, after the cylinder operates several times, leakage occurs remove part of the shim stock and a very slight amount of pressure on the packing. The reason for using shims is that the stack height of packings may vary several thousandths of an inch per ring depending upon the packing material. See Fig. 6 for V ring installation.

One word of caution: when reassembling a cylinder, do not place the packing into the stuffing box first and put the cover on, as the piston rod is likely to cut packing when reinstalled —except where O rings and Quad rings are inserted in front cover as shown in Fig. 7.

Dismantling, Repairing and Assembling a Hydraulic Cylinder

1. Dismantle cylinder in a clean location.

2. Clean each part. If the cylinder is to be dismantled for any length of time, coat the metal parts which are to be reused with a good preservative and store in protected place, not out in the weather.

3. Examine piston rod for straightness. If the rod is bent, place it in press and straighten.

4. Examine piston rod for scratches, scores, indentations, and other blemishes. If they are not too deep, remove them with a fine emery cloth. As mentioned before, if it is necessary to grind the rod, it is suggested that it be chrome plated in order to bring the diameter up to its original size.

5. Check cover bushings and cushion bushings for wear and finish. If they are not in first class condition they should be replaced.

6. If cylinder tube is damaged, either repair as directed elsewhere in this article or replace it.

7. In reassembling a cylinder, it is suggested that all the seals and gaskets be replaced. When metal piston rings are used, check cylinder manufacturer's literature for gap clearance. If synthetic or leather seals are used on the piston be extremely careful in placing piston into tube so as not to damage sealing surfaces.

8. If, for any reason, a metal piston with rings is to be replaced be sure to grind the piston concentric with the piston rod after it has been assembled to the rod.

9. When assembling cylinders having foot-mounted type covers, they should be assembled on a surface plate. Mounting pads of both covers must make full contact with the surface plate, otherwise you can expect trouble after placing the cylinder in operation.

10. Always pull up the cover bolts evenly. If O ring gaskets are used between tube and cover, the tension on the cover screws can be reduced to a minimum.

11. After a cylinder has been completely assembled, test it at low operating pressure in order to make certain that piston and rod are moving freely and are not being scored, or that they are not binding. Then increase pressure to its full operating range and check for leakage both internal and external. To check internal leakage put oil pressure in blind end cylinder port and force piston to the rod end. Check the amount of oil that comes out of the rod end cover port when the piston is in the forward position. Then place oil pressure in rod end cylinder port, run the piston to the blind end cover and check leakage at this position.

If leakage is to be checked at other positions of the valve, block the ports at these positions by external means and check as above. If excessive leakage occurs it will be necessary to disassemble and make corrections.

If the piston is sealed with synthetic or leather seals the leakage should be practically nil. If metal piston rings are used the leakage will vary with the operating pressure, the cylinder bore, and the oil temperature.

12. When replacing a cylinder in a machine or fixture, make certain that it is securely mounted. Remember these cylinders are capable of delivering a great force.

Steam Velocities Are Also Indicated

More on Pipe Sizing Charts

This Time for 7.5 and 10 Per Cent Pressure Drops Per 100 Ft

By **WILLIAM W. GAYLORD**, Consulting Engineer

WHEN THE pipe sizing charts published in PLANT ENGINEERING* were prepared, it did not appear probable that it would often be desirable to design piping for pressure drops greater than 5 per cent per 100 ft.

Recently in planning piping for plants using steam for process and heating only, it was desirable to design some of the piping for much higher pressure drops at periods of maximum load. In many of these plants the average daytime winter load is less than 70 per cent of the maximum load and under these conditions pressure drops up to 10 per cent per 100 ft at maximum load have been successfully used.

To cover this range, two charts have been prepared, one for a pressure drop of 7.5 per cent per 100 ft and the other for a pressure drop of 10 per cent per 100 ft.

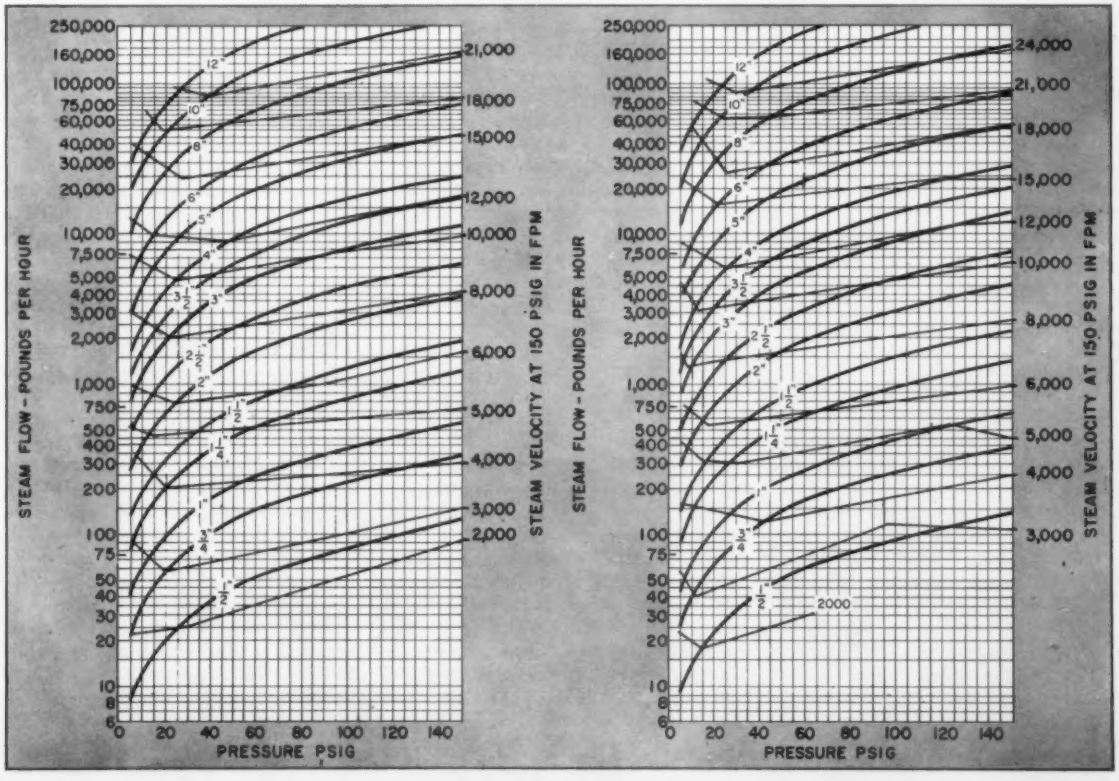
These pressure drops give high steam velocities in the larger pipes, and for this reason lines showing the approximate steam velocities corresponding to the capacities shown have been added.

For these higher velocities piping must be carefully laid out, well covered to reduce condensation to a minimum, and ample provision made for draining any condensation that may collect. Under these conditions steam velocities in the 12,000 to 14,000 fpm range in 4 and 5 in. pipes have been successfully used.

Even if it may not be advisable, in most cases, to design a piping system for a greater pressure drop than 5 per cent per 100 ft, these charts may be useful in showing the increase in load that could be carried should it be possible to raise the boiler operating pressure to provide for the increased pressure drop.

*See "Quick and Accurate Pipe Sizing Charts," PLANT ENGINEERING, October, 1953.

Chart at left is for a pressure drop of 7.5 per cent per 100 ft; chart at right is for a pressure drop of 10 per cent per 100 ft



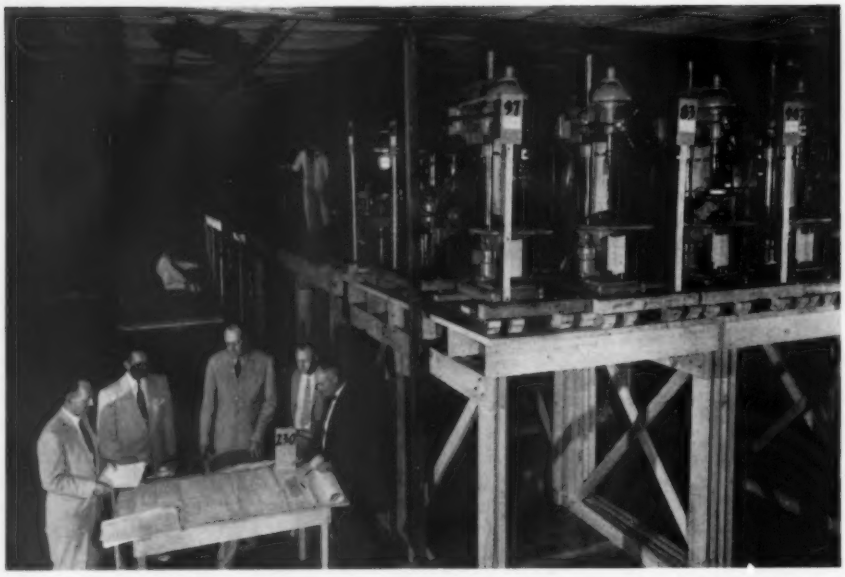


Fig. 1. This is a view inside the cocoon. Note construction of module with laminated timbers

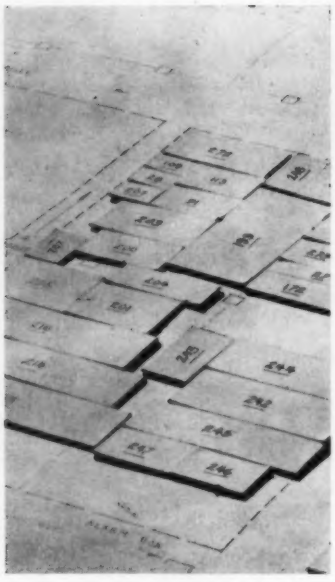


Fig. 2. Exact-scaled templates of

Module Decking and Templates Increase

BUILD A NEW warehouse . . . or get more capacity from the one you already have?

That's a question put to many a plant engineer. And too often—from management's viewpoint—a new warehouse seems the only answer.

Now, however, the spatial concept promises upwards of 50 per cent more capacity from our warehouses . . . a concept important to plant engineers everywhere.

The spatial concept: 1. adds another "floor" to the warehouse via "module" decking—6 ft by 6 ft by 6 ft deck sections which are reusable, removable and demountable; 2. eliminates all but main aisles; 3. pre-plans material placement by templates (the plant engineer moves a few cardboard templates in working out storage arrangements, rather than moving the actual materials or machinery); 4. eye-level placards on all skids simplify and speed location of material, regardless of warehouse size or complexity.

The Problem: Like many another warehouse, the Ordnance District's warehouse No. 2 at Wilmington, Calif., was filled to overflowing. Bekins Industrial Packaging was called in with a clear-cut assignment, either increase capacity by at least 33⅓ per cent, or recommend purchase or lease of additional space.

Involved were hundreds of precision machine tools . . . these being "laid away" against a national emergency, or held in storage pending awarding of Ordnance contracts to manufacturers.

As with non-military storage, aim was to: 1. make stock withdrawal easy; 2. assure maximum protection for delicate tools; 3. utilize every inch of warehouse; 4. reduce storage costs.

But warehousing was complex. The 600- by 600-ft building was single-storied, had a 14-ft ceiling clearance. There was no second deck, not even a mezzanine. Nor was the structure sufficiently heavy to allow construction of a second floor, even if truss height had permitted. Another complication: machine tool numbers were stenciled on skids so tool numbers could be read by warehousemen. And where intra-bay aisles were fork-lift wide, space wastage was even greater. Additionally, some machine tools weighed upwards of 100,000 lb, stood as high as 10 ft from the floor. Then, too, such machines as lathes and automatics—with highly polished precision surfaces—required the protection of humidity control.

Statistics: When Bekins took over the job, some 25,640 sq ft of the warehouse were in use. Skid rearrangement and elimination of aisles reduced in-use area to 16,870 sq ft, a savings of 8,770 sq ft. Decking gave the warehouse a bonus 2500 sq ft. All told, Bekins' "spatial concept" reclaimed or added nearly 12,000 sq ft, nearly a 50 per cent gain in usable storage.

Scope: Bekins' industrial packaging manager, Noble W. Jones, began with a 30-day engineering survey. Its aim: to decide which tools, by necessity, must be held to strict humidity control; to make an exact scale template of every machine's skid, so skids could be pre-positioned on the warehouse floor, or assigned to a deck, above the floor (here, machine weight was a big factor); and most important, to group together all tools by their manufacturing sequence.

How They Did It: Engineers began by drawing up a comprehensive list of every machine either currently in the warehouse or scheduled for storage there.

The list hewed to "manufacturing requirements."

Suppose the warehouse was to lay away all machine tools needed to produce an aircraft 50-mm gun. In effect, then, a complete production line was involved . . . every machine tool, plating tank, industrial furnace, etc., required in the "end item's" manufacture. Drawn up was a list of tools specialized to the end item.

(All this, of course, is part of Ordnance's lay away program, aimed at getting back into production, in case

skids, pallets meant money-savings for warehouse

Fig. 3. From station warehouse boss can "call out of hock" every skid

Warehouse Capacity by 50 Per Cent

of emergency, within 30 to 60 days).

With scores of end items listed—and under them, the tools needed for their manufacture—Bekins set about simplifying tool identification. For each machine's multi-digited serial number, Bekins substituted a 3- to 4-digit warehouse locator number (same system has been adopted by many state governments. Rather than meaningless strings of unrelated numbers on auto licenses, they're switching to 6-digit groupings, which are easily read and just as easily remembered).

With every tool assigned a simplified number, engineers laid out a template plot-plan.

Template Layout: Plant engineers have long used exact-scale templates to pre-plan machine installations, figure aisle widths, compute utility runs.

But this is likely template's first use in the warehousing of machine tools (or anything else, for that matter). For every tool's skid a template was made. Scale was 1 in. to 10 ft. As a template was finished, it was numbered with that skid's simplified number. And this was cross-indexed on the tool list, along with the tool's weight and height.

Object: So every skid's eventual position could be pre-planned with an eye to space conservation.

Planners began their jigsawing with the largest templates—thus skids. All templates pertaining to a single end item were grouped. Largest templates were positioned first. Around them, the smaller ones were fitted in. And, because locator numbers were to be uniformly at eye-level (thus visible from every bay's perimeter), skids could be placed close together, eliminating space between them.

Main aisles were held to 10-ft widths; feeder aisles to 4 ft.

Concludes packaging manager Jones, "Templates gave a visual picture of the entire warehouse . . . gave real insight into the effect of any proposed change. With a change envisaged, we merely had to move a small cardboard template a few inches, rather than roll a 30,000-lb skid across the warehouse."

With templates made, and machine weights and heights listed, engineers turned to design of double decks over some tool-group areas.

Module Decking: For warehousing, particularly with tools moving in and out almost daily, Bekins ruled permanent decking impractical. Instead, engineers came up with what Bekins calls "module" decking: reusable, removable, demountable and standardized wooden deck. Prefabricated outside the warehouse (a big advantage), these modules are 6 by 6 ft, the deck 6 ft above the warehouse floor. In effect, they form a second floor.

Module decks are fork-lifted into the warehouse, set one against the next. Although bolted together, they are not bolted or in any way anchored to the warehouse's concrete floor. Bolts are quickly set (and as quickly removed) by an impact tool.

Module's 36 sq ft of decking can take 150-lb loading per square foot.

Modules are built from standard lumber but their design turns lamination to advantage. Rather than use 12 by 12's as jacks (module supports), engineers conceived a kind of laminated support. Typically, a module support consists of two 2 by 6's separated by a 2 by 4. When jacks of two adjacent decks are bolted together, they form a laminated 12 by 6.

In effect, then, Bekins had created a 12 by 6 with the same bearing surface as the larger timber, but with less than one-third its weight. Laminated construction had another advantage: 12 by 12's can't be successfully bolted where they meet at a corner. But laminated 12 by 6's can be bolted. Strengthening the laminated jacks are 2 by 4's run diagonally, corner to corner and bolted in place.

Open-end construction permits a module to be positioned over a machine tool skid, creating an upper deck, yet allowing removal of the lower skid by fork lift (because no cross members interfere with the fork).

Module decking created some 2500

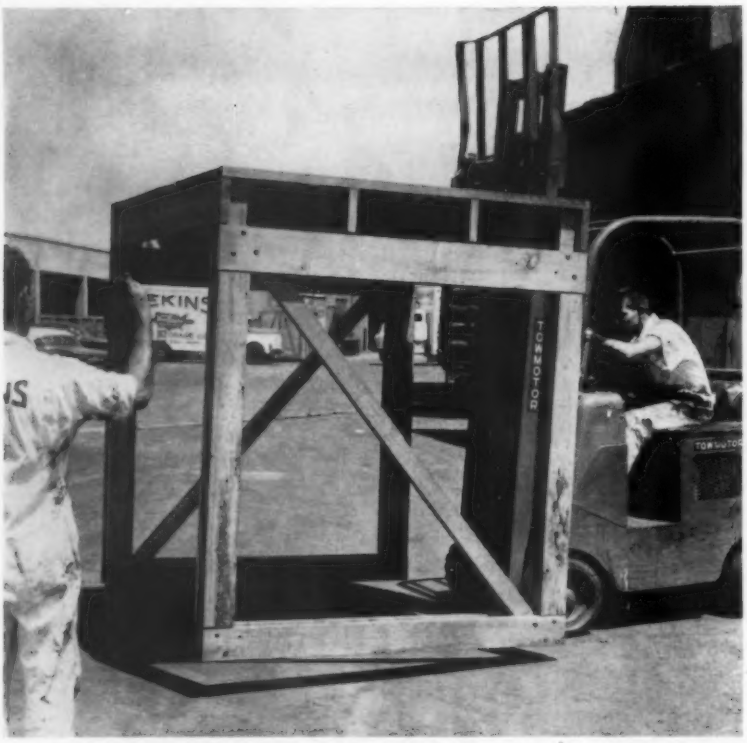


Fig. 4. This section of module decking has been prefabricated outside building

sq ft of new storage space. Of this, about 1620 sq ft are inside the controlled humidity area. The remainder is outside the control area. Another 8700 sq ft of bonus warehousing was picked up simply through careful skid placing (thanks to templates) and by eliminating 2-ft aisles which previously separated all skids (when tool numbers were stenciled on skids).

Sums up industrial packaging manager Nobles, "We decided that decking versatility would be greatly increased by building it up of independent units, each having a surface area of 6 sq ft. Each unit was designed so that two jacks 6 ft high and 6 ft long could be prefabricated outside the warehouse. During installation, it was necessary only to fasten 2 by 8 joists to the jacks, then screw down 2-in. prebored flooring."

Some other advantages of module decking: 1. except for its bearing on the floor, deck in no way depends on the warehouse for support; 2. decks can be broken down and rearranged at any time; 3. prefabbed jacks are entirely of bolted construction, standardized even to diameter and length of bolts; 4. each decking unit adds 36 sq ft on the deck, with maximum loading of 150 lb per sq ft, and 30 sq ft of usable storage under deck, on the floor. Thus, each unit increases usable storage space by 30 sq ft.

Next, the humidity-controlled hutment was built.

The Hutment: Like its name, the 60- by 60-ft structure (truss high) is an isolated room within the warehouse, a cocoon whose relative humidity is held to less than 40 per cent (temperature is not a critical factor so long as humidity is controlled).

Framed by 4-in. by 8-in. by 15-ft. channels and 3-in. by 3-in. angles over which wire mesh was stretched, the cocoon was sprayed from the outside with a vapor-proof mastic barrier material. Minimum wall thickness approximates ⅛ in. Two dehumidifiers monitor the hutment's interior, each fronting an inspection port through which humidity and temperature gages are read. Housed in the hutment are rust-prone machine tools.

Skid Location System: System begins with eye-level placards, rising from each skid, whether skid is floor-mounted or stored on a module deck.

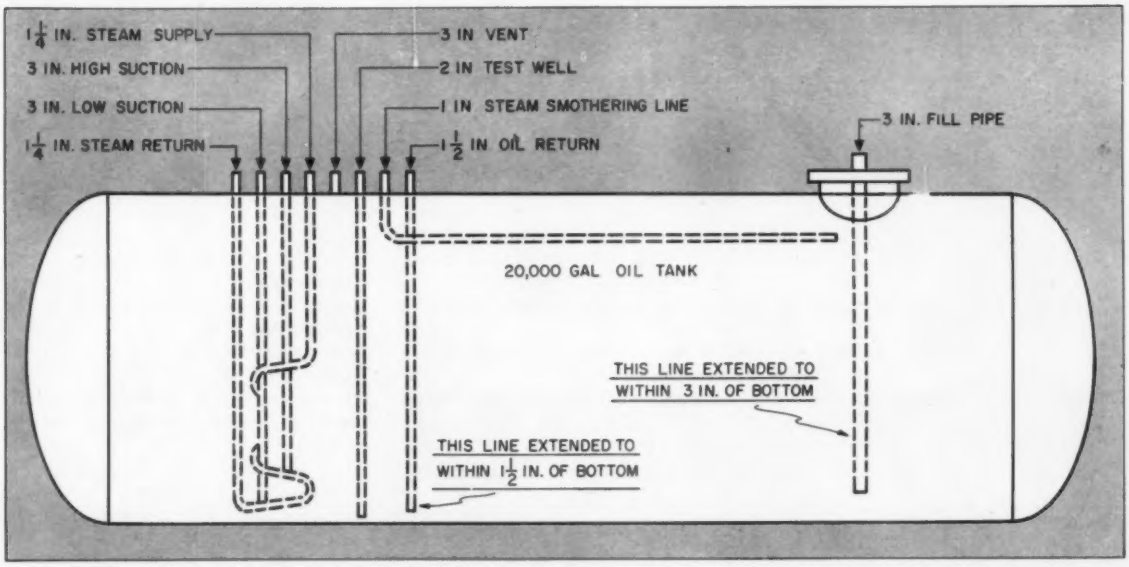
Locator placards are unusual in at least three respects: 1. all are standardized, 12 in. high, 8 in. wide, their 4-in. numerals black against natural colored fiberboard; 2. typed below each of these simplified numbers (3 to 4 digits) is the particular machine's full serial number (its official designation); 3. all placards are eye-level, and uniformly high whether rising from floor-mounted skids or from skids stored on a module deck. Floor placards stand 4½ ft above their skids. Placards on "decked" tools stand 4½ ft above their skids.

From a master tool control index, the warehouse chief can "call out of hock" any tool, simply by scanning this templated board. Rather than say, "Get me tool No. 3485858696969," he says, "Get tool 34." Warehousemen can spot the placards from as far off as 100 ft (and farther). And because tools pertaining to a single end item are grouped together (except for machines in the hutment), seldom is one tool moved. More often, an entire group moves out of the warehouse.

How To Say Good-By to Sludge

Rearranging Pipes in Fuel Oil Tank Solved the Problem

By JAMES G. ARMSTEAD, Maintenance Engineer, F. C. Huyck & Sons, Rensselaer, N. Y.


1¼ IN. STEAM SUPPLY
3 IN. HIGH SUCTION
3 IN. LOW SUCTION
1¼ IN. STEAM RETURN
3 IN VENT
2 IN TEST WELL
1 IN STEAM SMOTHERING LINE
1½ IN OIL RETURN
3 IN. FILL PIPE
20,000 GAL OIL TANK
THIS LINE EXTENDED TO WITHIN 3 IN. OF BOTTOM
THIS LINE EXTENDED TO WITHIN 1½ IN. OF BOTTOM

Pipe rearrangement consisted of extending the fill pipe and the hot oil return line to within 3 in. and 1½ in. respectively, of the bottom of the tank. After one year of operation, there was no evidence of water or unpumpable sludge

IF YOU USE No. 6 (Bunker C) fuel oil you are aware of the difficulties encountered as heavy fractions and impurities settle along the bottom of a storage tank, mix with water which also settles, and form a heavy sludge. For many years this condition was corrected by pumping the tank as nearly empty as possible and physically removing this heavy sludge. It has sometimes been necessary to clean a tank in this manner as often as once a year.

In our case, when we were no longer able to draw satisfactory oil for combustion, our fuel oil suppliers pumped several hundred gallons of pumpable material from the tank, which they burned in special burners at their own steam plant.

We then sent men down into the tank with shovels and pails and removed quantities varying from 25 to as much as 100 gal of sludge. In addition, we periodically sampled the tank bottom and removed water with the use of an extended bilge pump. The frequency of this operation varied as the quantity of water removed indicated a change in rate of accumulation.

This, of course, is an expensive procedure, both in the oil wasted and in the manpower required. Being a distasteful job, it is one which the men do not like to do and, if not properly supervised, may not do well.

In the last several years there has been a marked increase in the number of companies offering sludge solvents which disperse this material and keep it in suspension so that it is continually being pumped from the tank and burned in minute quantities. We decided to make some investigation of the relative economics of this method of keeping storage tanks clean.

As a start, we acquired and read, "The Sludge Problem in No. 6 Fuel Oil Tanks—Report of Investigations 5113" prepared by the Bureau of Mines of the United States Department of the Interior. This manuscript is dated February, 1955, and is available through the U. S. Government Printing Office, Washington 25, D. C. The following are excerpts from the conclusions stated on pages 1 and 2 of this report.

"Any satisfactory additive, to prevent sludge formation in tanks effectively, should at least delay the sedimentation of the dirt and water, which are the sludge-forming components. The proprietary additives tested did not do this, and, since they were tested in so simple and basic counterpart laboratory apparatus, no interpretation of its results as related to storage tanks appear to be necessary. The apparatus did not impose an especially severe test, as is shown by the fact that certain chemicals did maintain homogeneity of the oil under the test conditions.

"It may be argued that some additives cause the sludge sediment to be more fluid, since an additive may perhaps delay consolidation of the sludge into an especially viscous mass. However, the additives did not retard sedimentation; and the sediment in additive-treated tanks was no less troublesome, was no more pumpable, and had a composition generally no different from the sediment in tanks that were not treated. Also, in some instances, the quantity of sediment precipitated

from an oil was increased by a contribution from the additive . . .

"One practical method of preventing intolerable sludging in storage tanks is controlled bunkering. The contribution of sediment from one truckload of oil is small. If it can be prevented from accumulating with the sediment from previous truckloads, no great accumulation will result. It is recommended that the new oil be bunkered through a pipe that goes nearly to the bottom of the tank in order to stir up any material that has settled out. Reprecipitation is not instantaneous, and a low suction take-off, about 6 in. off the bottom of the tank, will cause much of the sediment to be carried with the oil to the furnace and be burned without difficulty. What is taken out in this manner will correspond roughly to the sediment added with the new oil. Operators using this scheme of controlled bunkering have not been troubled with sludge."

Following the study of the above report, this problem was discussed with several local plant engineers, and we found only one who was successfully using a fuel oil additive. We were unable to determine the degree of success he had attained since he had not made a physical examination of the tanks during the period he has been using an additive. Sampling tests taken 3 in. off the bottom show traces of free water but no sludge.

Another plant engineer who has followed the technique outlined in the Bureau of Mines report for a period of six years, has had little or no indication of sludge formation in his storage tanks. This engineer in addition to extending the fill pipe had also extended the hot oil return pipe, which returns to the storage tank excess oil pumped from storage to the pre-heating and pressure pumps and which exceeds the quantity burned. This, of course, serves as an additional source of agitation at the bottom of the tank and because of the higher temperature helps to maintain constant motion of the oil stored.

In August of 1955 our two 20,000-gal storage tanks were both pumped dry, and existing water and sludge removed physically so that the tanks were, for all practical purposes, clean. In one tank, we extended the fill pipe and the hot oil return line to within one pipe diameter of the bottom of the tank.

After operating with these two tanks about equally dividing our load (approximately 600,000 gal per year per tank), these tanks were opened and cleaned for inspection in August of 1956. In both tanks we found no unpumpable sludge formation.

Our normal practice in the past has been to physically clean these tanks on about a three-year cycle, so we were a little surprised at finding no sludge in the tank in which the piping had not been rearranged; but not at all surprised to find considerable water had settled to the bottom of this tank. It is safe to presume that within another year dirt would have combined with this water and we would then have sludge.

In the tank in which the piping had been rearranged, we found no evidence of water or unpumpable sludge in any part of the tank bottom. The cost of making these piping changes is about $400.00.

Pleased with the results, we have changed the piping in our second tank!

These tanks will be operated for five years without cleaning. After this period, we will repeat our physical cleaning process, which under these better conditions is estimated at $50.00 each. We do not believe this to be uneconomical, since good preventive maintenance should require occasional inspections of the interior storage tanks in order to observe the conditions in the shell, piping and heating coils.

Boiler and Insulation Get Shiny New Covering

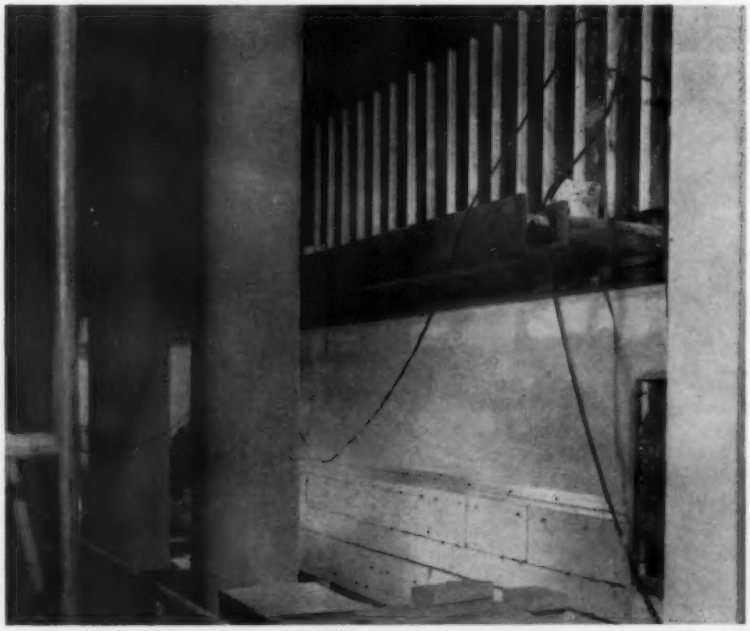
IN THE PAST, the practice of shrouding boiler installations in the power plants of Detroit Edison Co. was to encase the boiler and insulation with sheet metal. It was then given a coat of paint.

However, with the introduction of a "skin" casing next to the water wall tubes, the company had the alternative of using either a plastic or sheet metal covering.

With the thought that the plastic covering might be damaged occasionally and require repairs, the company decided to use metal to cover the insulation on the No. 1 steam generator at its River Rouge power plant.

After considering various types of metal covering, the company selected an aluminum-coated sheet steel made by the Armco Steel Corp. It was selected for its resistance to heat and corrosion and for its ability to reflect heat. The company also felt that it would eliminate periodic painting, require less maintenance and present an attractive appearance.

Insulation and lagging of the indoor duct work was done in the same manner as the boiler proper.



View of the No. 1 boiler at the 7th floor elevation shows the insulated downcomer tubes, the first and second layers of block insulation on the boiler walls and the aluminum-coated sheet steel covering on the insulated boiler walls

Quiet, Efficient Power Transformers

Test center aims for the ultimate . . . Quiet room, surge generator and radio influence room all contribute

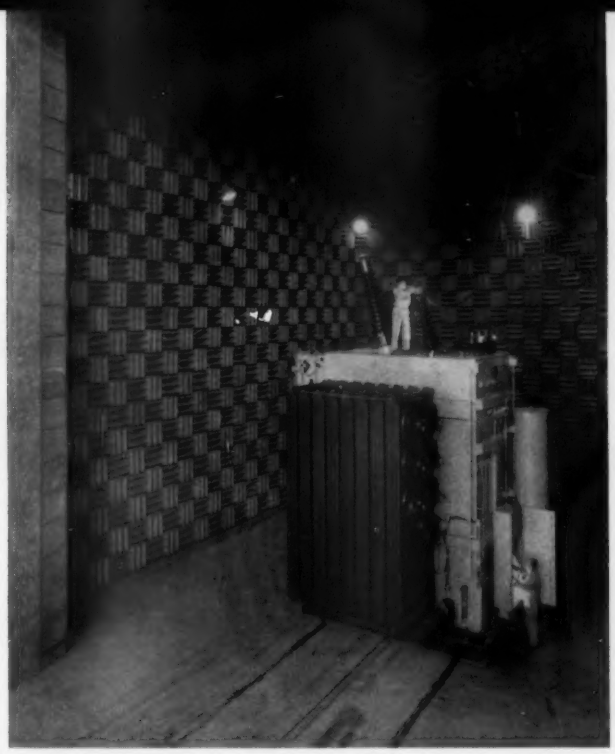


Fig. 1. Vault is designed for ambient noise level of 30 decibels

CONCURRENTLY with its recently completed $13 million expansion program at its Transformer Division, Westinghouse Electric Corporation has completed a test center for transformers that provides for complete commercial tests on the units it ships to customers.

And, as a research and development tool, the test center will aid in the designing of transformers that are quieter, more efficient, smaller and lighter than those of equal capacity now in production.

The center is in four related parts —a commercial test floor, an anechoic vault, a high-voltage development laboratory and a special room for measuring radio influence voltages.

Fig. 2. Transformer on turntable in main test floor. Motor-generator set at left

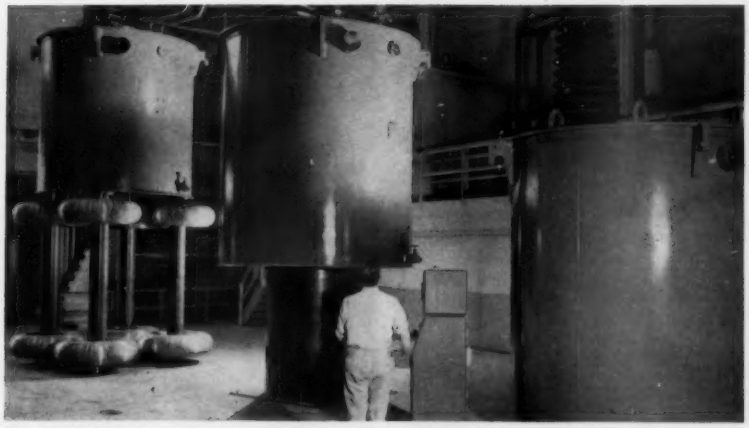


Fig. 3. Three-unit cascade transformer provides 1,050,000 volts at 60 cycles

Fig. 4. Loop antenna tracks RI voltages

Fig. 1. This is first of a group of industrial buildings constructed on new plant site. In all, 105 possible sites were considered

Building a New Plant?

How This Company Chose Its Site

MANY INDUSTRIAL concerns are moving to the country, usually due to the need for more space, which isn't available in their present locations. While companies may continue to maintain the old sites, they are acquiring these new locations for the rapid expansion of various phases of their operations.

The Haloid Company, Rochester, New York, manufacturers of photographic products including photo-copy machines and products for Xerography, recently constructed the first of a group of buildings under a long-range building program on a 105-acre site at Webster, near Rochester, New York, see Fig. 1. The main factory and headquarters in downtown Rochester will continue to be used.

Facilities are modern and efficient, providing complete control conditions. The beauty and attractiveness of the land promise to make the location there a model one, according to company executives. Townspeople and authorities were most cooperative in the development of Haloid's new site at Webster.

Follow This List

A checklist of factors of basic importance in choosing the new plant sites was used by the Haloid Company. The program of finding new sites was headed by L. B. Mulloy, Assistant Vice President and Chief Plant Engineer; and Carl E. Elmendorf, Project Engineer of the company during the period it was looking for a new home. (See Fig. 2).

The company considered 105 sites and officials visited 87 of them. The number was narrowed to 25 and then to 10. After a detailed study of the 10, the number of possibly suitable sites was cut to four and options were taken on three of them. The town of Webster was the final choice of site.

As a preface to the checklist concerning their plant site investigation, Mr. Elmendorf said, "It should be understood that we did not seriously consider any sites outside of Monroe County, the county in which our main plant and the city of Rochester are located. For this reason, many factors pertaining to marketing, source of raw materials, character of community, etc., were not considered. However, the check list was compiled and followed closely in the analysis of our requirements.

"These requirements are not special for our needs; rather, their order is the important factor. These requirements would apply to almost any industry. Water, sewers and unpolluted air were of prime importance to us, but perhaps these might be of lesser importance to another industry."

Here are the principal points con-

sidered in the order of their importance in company opinion:

1. Water: The ability to obtain 1½ million gallons per day of cold water of proper quality for use in the manufacturing process was the most important consideration. Quality was important and low temperature desirable since water is used directly in the process and much of it requires cooling to 38 F.

A municipal water source that could provide water at a uniform low temperature would provide a savings on refrigeration equipment and operation costs. Webster's supply is well water and maintains a constant 50 F all year.

Trial Runs

To check the quality of this water beyond laboratory analysis, quantities were trucked from Webster to the main Haloid plants in the city and used for actual production runs to determine its suitability. It was also desired that, in addition to an adequate water supply from a municipal source, there should be a practical method of developing the company's own source of water if the need ever arose. The Webster location is only three miles from Lake Ontario, making a solution possible.

2. Sanitary Sewers: Large water requirements by the company produce a problem in the disposal of waste water which, fortunately does not adversely affect the normal operation of a sewage disposal plant. The requirements for adequate sewers and a treatment plant goes hand in hand with the large water usage. Since a considerable portion of the water is used directly in the manufacturing operations, this polluted waste cannot be dumped into open streams without treatment. Rather than enter into the sewage treatment business, it was decided either to locate in a community where these facilities were available or where the municipality indicated a desire to construct them.

3. Personnel and Availability of Labor: It was believed that the long term construction of facilities at Webster will allow ample time for employees to make the necessary adjustments. During the several months when the investigation was being conducted, approximately 50 employees relocated their homes. As the outer belt loop and expressway connections to the inner loop in Rochester are completed, access to this site will become even more convenient. There will be some changes in personnel, but, in general, no difficulty is expected in this regard.

4. Air Pollution: Due to the nature of the company products, which require an absolutely clean atmosphere for production purposes, the new buildings will be air conditioned as much as feasible. Special emphasis is placed on filtering makeup air for these systems. The cleaner the air the less will be the problem of filtering.

5. Rail Facilities: Rail facilities were thought highly desirable. "While not an absolute requirement to us at this time," says Mr. Elmendorf, "nevertheless, they were considered as one of the important factors. In this day of large research budgets, where the development of new products occurs frequently, the time might well come when the bulk delivery of raw materials or transportation of finished products via railroad might be needed. The same may hold true for defense work in the future."

6. Storm Drainage: Storm drainage facilities through natural drainage was desired for the site. As a plot size of at least 100 acres was being considered, this drainage, if not sufficient, could be an item of major expense.

7. Taxes: Considered as one of the factors for obvious reasons.

8. Electric Power: Availability and dependability of electric power was a requirement. In the particular sites considered, power from the local, private utility was available. The final site selected has three separate feed lines from two sources to a substation located adjacent to the property.

9. Zoning: It was the company's desire to make the final selection on the physical merits of the site, not only on the zoning. When the three best possible sites were under study, all were being considered for rezoning by the municipal authorities.

10. Area Requirements: Based on the theory that land acquisition is the lowest cost of any phase of the project, the company wished to acquire a site large enough to serve all their requirements for the next 50 years.

11-12. General Topography and Soil Land Cost: No elaboration is necessary on the general topography of the area. Land cost again is a small proportion of the cost for the developed site and should be treated accordingly.

Overall Operating Expenses

These additional items were then considered as part of the company's yearly operation expense:

1. Water rates.
2. Operational savings by using cool, constant temperature water.
3. Interest on investment in land and services.

The estimated total of these items was considered relatively high on the requirement check list, as these costs are continuing year after year.

Certain intangibles were also considered:

1. Driving time from downtown and from present plants.
2. Definite assurance of water availability.
3. Near public thruway and airport.
4. Cooperation of municipal authorities.

Of the intangible items considered, the only one necessary to comment on is that pertaining to cooperation of municipal authorities. This cannot be stressed too highly in communities such as those adjacent to Rochester, which are predominantly residential in nature.

Fig. 2. Guiding manufacturing operations and choice of site for new plant were: K. Dennis, Vice President and Works Manager; H. S. Kuhns, Executive Vice President and Controller; Lorne B. Mulloy, Assistant Vice President and Plant Engineer; and Joseph L. Noble, Assistant Vice President and Assistant Works Manager

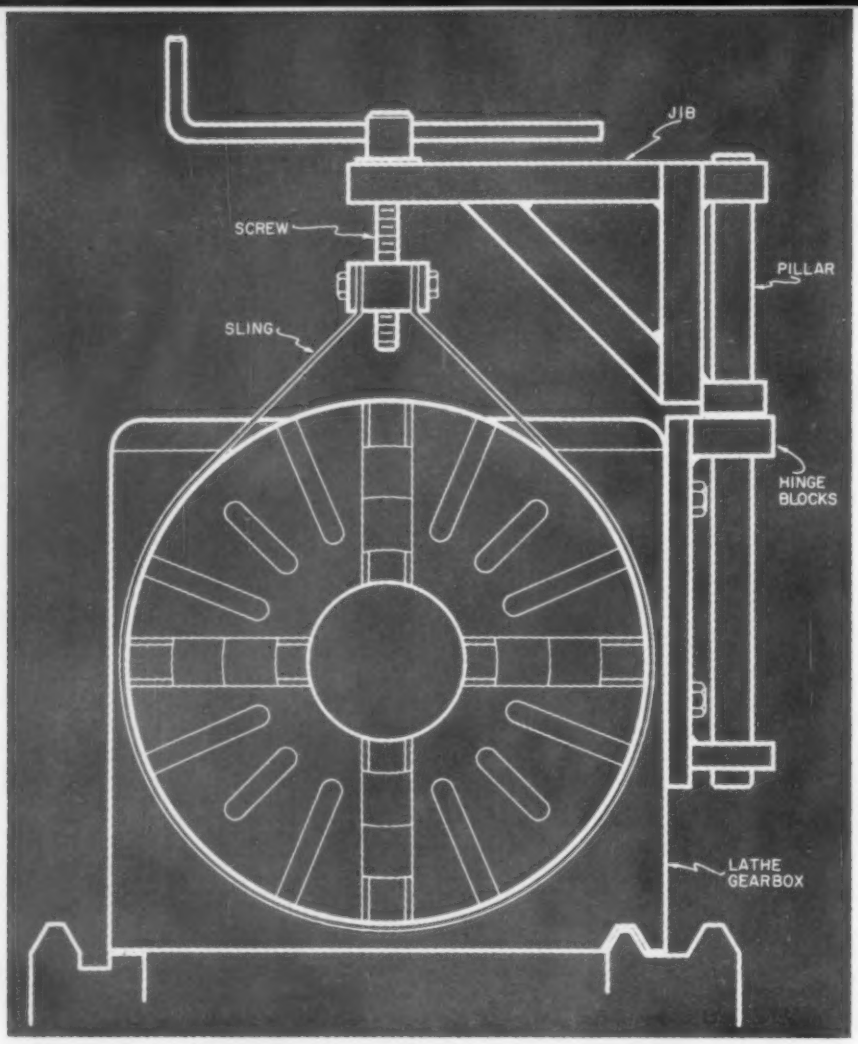


Fig. 1. Jib crane, equipped with sling, in position on lathe to remove chuck from spindle. Turning handle at top lifts weight from lathe spindle to crane

Lathe Operators' Helpers

Jib Cranes, Articulated Hinges Lift Heavy Chucks

By F. E. RILEY, Mechanical Engineer

INCLUDED in the auxiliary equipment of large engine lathes in maintenance and production machine shops are heavy chucks and face plates. For general machine shop work, the chuck must be removed so that the lathe centers can be used and the faceplate and the chucks must be interchanged frequently.

On lathes up to about 12-in. swing, chucks and other spindle attachments can be handled by the lathe operator, but for larger lathes, a helper must be employed to assist the operator in getting the chuck on and off the spindle. Or, if the shop overhead crane is used, a lot of time is wasted by operators waiting for the crane.

A portable crane mounted on casters can often be used for removing the chuck from the lathe spindle, but the operator has to bring the crane to the lathe and then arrange a rope sling or some other lifting attachment for attaching the chuck to the crane hook.

Quick interchanging of chuck or face plate is essential in lathe work covering a wide range of operations and different components, if the operator is to devote the major part of his time to machining metal. The amount of time spent in waiting for cranes, arranging lift tackle or man-handling heavy chucks is a dead loss from the production viewpoint and can be reduced to a minimum by providing special handling equipment as part of the lathe structure.

On small lathes below 12-in. swing, dismounting of the chuck is assisted considerably by the provision of a wooden block shaped as illustrated in Fig. 3. The block is arranged to slide under the chuck which will rest safely on it when disconnected from the lathe spindle. The wooden block resting on the lathe bed can be slid away from the lathe spindle nose so that damage is avoided to both nose and bed slides.

A chuck two feet in diameter can weigh 100 lb or more, so it is worthwhile fitting special handling equipment to the lathe. One version of this is illustrated in Fig. 1. A small jib is mounted on the back face of the lathe headstock gear box. The jib assembly can be of welded steel construction comprising a mounting plate with two hinge blocks. Through the hinge blocks passes a vertical steel pillar at the top end of which is secured the jib arm.

This arm can swivel on the vertical

pillar and at its outer end carries a vertical screw. The axis of the screw is over the axis of the lathe spindle when in the operating position. The vertical screw has a T-handle at its upper end shaped to form a crank for turning.

At its lower end, the screw engages with an internally threaded steel block, in which are secured the ends of a sling made from broad belting. The belting can be of woven thread or bonded fabric and rubber, but it should have adequate strength and be in good condition. The ends of the belting are secured to the block by sandwiching them between steel plates which are held in place by screws passing through them and the belting and engaging with tapped holes in the block.

In use, the sling is wrapped around the chuck on the spindle and a vertical pull is applied by means of the screw, to take the weight of the chuck. The chuck can then be released from the spindle and swung clear, supported in the sling. One method of using this jib is to swing it around the back of the headstock gear box where the chuck can hang until needed. In this way, the chuck need never be placed on the shop floor and it can be handled easily by the lathe operator working single-handed.

There is no danger of the chuck falling sideways out the sling, if the belting used is equal to the width of the chuck body, and the arm of the jib is high enough over the chuck body to insure that the angle between the two ends of the sling is not greater than a right angle.

Another version of the built-in jib crane is illustrated in Fig. 2. Here, the sling is replaced by a block which is attached to the front face of the chuck body. The block has a vertical tapped hole for engagement with the lifting screw on the end of the jib. A screwed stud projects from one of the block side faces for insertion into

(Continued on page 244)

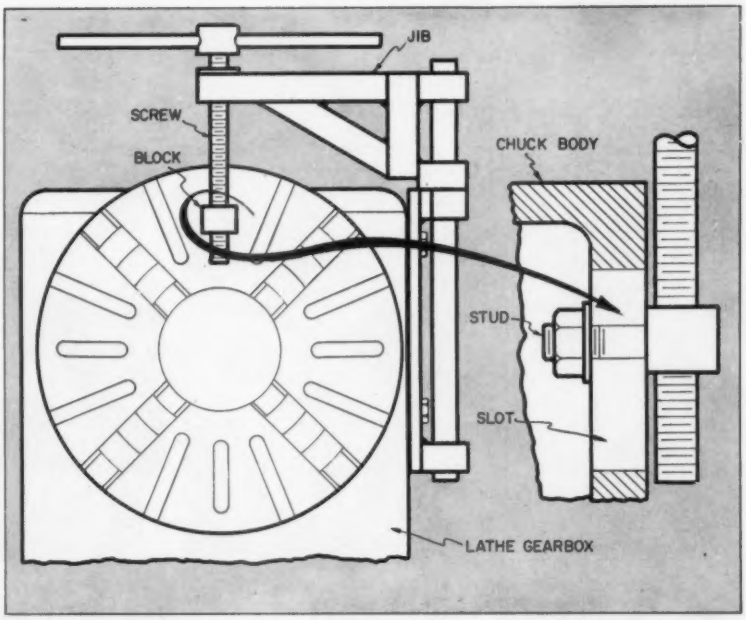


Fig. 2. More "mechanical" version of lathe crane utilizes drilled and tapped block to connect jib crane to chuck face

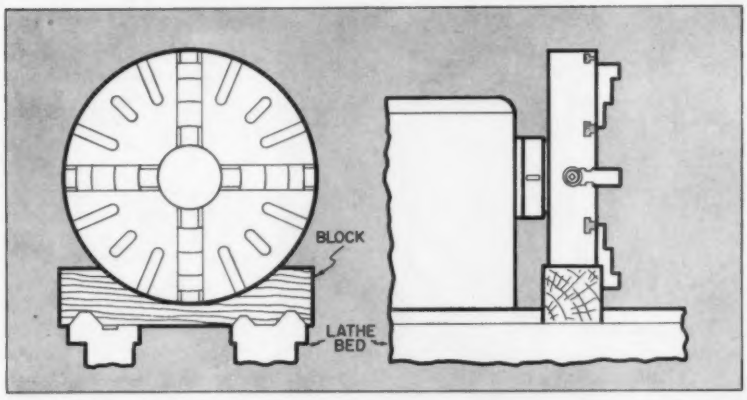
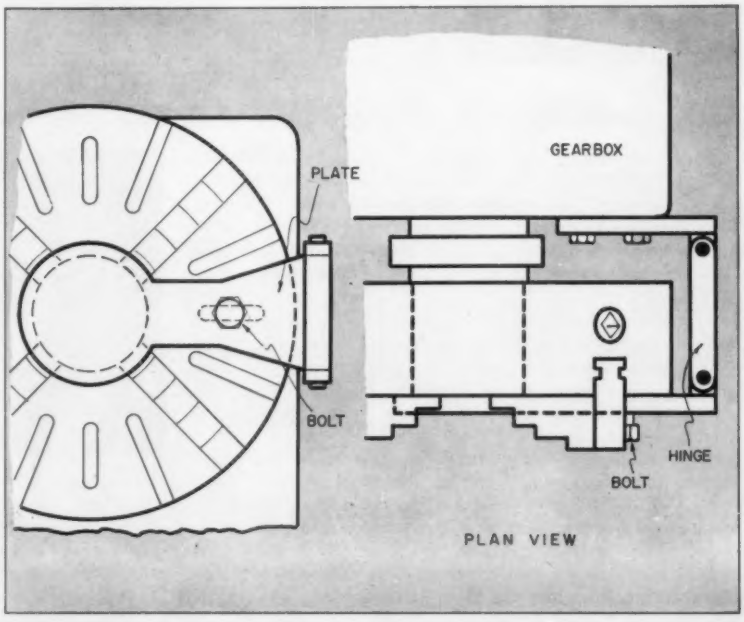


Fig. 3. For small lathes, where chuck can be handled by operator, wood block is used to cushion chuck on lathe ways

Fig. 4. Integrated device for handling chucks is articulated hinge mounted on gear box. Arm is bolted to chuck



Pneumatic Chip Handling System Carries Chips Over the Top of the Mill

IN BERLIN, N. H., a 100-year old paper mill is in the process of spending 17 million dollars in an expansion program —an integral part of which is an Airveyor system for conveying bulk quantities of wood chips.

Two types of chips are handled by the system: hardwood chips weighing 25 lb per cu ft, and soft wood chips weighing 17 lb per cu ft.

The chips arrive in railroad hopper cars and trailer trucks. A rail spur permits mechanical unloading to screening equipment from the rail cars. The discharge from the screens is picked up by the Airveyor and conveyed to a chip bin above a digester, at the rate of 30 cords per hour.

The Airveyor system, designed and built by Fuller Company, Catasauqua, Pa., as installed at the pulp mill, is the positive pressure type, with an air stream flowing through the conveying duct, carrying the chips with it. A pass through a single-stage cyclone receiver drops the chips onto a belt conveyor, which moves the chips into a chip storage bin. The conveying duct is 170 ft in length.

Mounting the system on top of the buildings, where it forms part of the "skyline," saved valuable floor space in the plant.

"Hot" Automobile Tire

FOR THE first time, atomic energy has been successfully used to vulcanize an automobile tire. B. F. Goodrich Company scientists said they believe the tire is the first large commercial item ever processed by nuclear radiation, and the first basic change in the curing of rubber products since the discovery of vulcanization.

The tire, in a steel mold, was vulcanized by rotating it slowly over radioactive fuel elements in a 17-ft-deep water-filled canal, the water protecting the scientists from radiation.

Hot Aluminum Extrusions

SEVERAL separate operations in the heat treating of large aluminum-alloy extrusions are eliminated in a new application of a roller-hearth furnace built by the Westinghouse Electric Corporation, and installed at Halethorpe, Md., plant of Kaiser Aluminum Company.

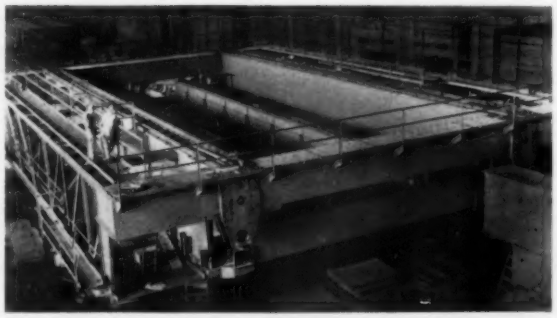
Extrusions are now brought to a 103-ft charging table by conveyor; charge doors open automatically and extrusions go into the 112-ft furnace at 50 ft per minute. Maximum operating temperature is 1000 F.

Ladle Crane for Steel Mill Designed With 500 Tons Capacity

FIRST OF THREE similar units to be built, the world's largest ladle crane is under construction. It consists of a bridge having four welded steel girders with a span of 77 ft from center to center of trucks, and runs on 48 rolled steel wheels, each with a 30-in. diam. It will handle a ladle having outside diameter of 17 ft, and a height of 17 ft 3½ in.

The large or main trolley is of 500 tons capacity, is of welded construction and runs on sixteen 30-in. diam rolled steel wheels. Auxiliary trolley is of 75-ton capacity. The large trolley is used to lift the ladle of molten steel, the small trolley is used to tip the empty ladle and for open hearth clean-up purposes.

Special self-equalizing four-wheel trucks on the crane insure that all wheels bear on the runway rails; each truck weighs 20,000 lb. Quick changing of bridge wheels is possible by merely jacking the crane a fraction of an inch. The main trolley frame, weighing 640,000 lb, must be assembled in the construction shop, disassembled into eight sections for shipping, and reassembled on the bridge.



The crane is reeved in 76 parts, with 6,660 linear feet of 1⅜-in. steel wire rope. Rope used was 6 x 37 purple strand hemp center.

The builder of the cranes, the Morgan Engineering Co., Alliance, Ohio, estimates that 10,000 manhours were expended to design and make the detail drawings for the job.

CAN BE INSTALLED ANYWHERE. Here workers begin to feed RoZone-RoSeal cable into conduit inside underground vault of St. John's Hospital. This versatile cable can be used anywhere—in the air, in conduit and ducts, direct in earth, even in water.

EASY TO PULL. Workers at the new St. John's Hospital in Tulsa draw Rome's easy-pulling high-voltage cable from underground switch vault to surface and power transformers. The hospital's architect recognized *all* the advantages of RoZone-RoSeal (see his letter below).

Profit from this architect's experience with Rome's premium high-voltage cable

LEON B. SENTER, A.I.A.
ARCHITECT
506-7 PHILTOWER BLDG.
TULSA, OKLAHOMA

November 28, 1955

Regarding our choice of RoZone-RoSeal cable for St. John's Hospital:

We can tell you that due to the nature of the building, extreme reliability was the first consideration.

Closely following were the requirements of moisture resistance, inductive capacity in the configuration as laid, and uniformity of product.

We found that a specification built around Rome Cable's RoZone-RoSeal satisfied all the above.

Very truly yours,

LEON B. SENTER, A.I.A.

John C. Penafeather

John C. Penafeather
Mechanical Engineer

JCP:lz

He wanted the same things you probably want in a high-voltage cable: reliability, moisture resistance, the right electrical characteristics, and uniformity. He found them all in Rome Cable's RoZone-RoSeal.

You can use this cable anywhere—in the air, in conduit and ducts, buried in earth, *even in water*. Here's how it compares with most conventional thermosetting nonmetallic cables:

- Costs less.
- Greater resistance to moisture and comparable resistance to abrasion, crushing, impact, chemicals, and oils. oils.
- Easier pulling and bending. The RoSeal (polyethylene) jacket has a lower coefficient of friction than any other jacket material. And it bends easily at temperatures as low as −40° C.
- High corona levels on power cables.

Rome Cable's RoZone-RoSeal met this architect's rigid specifications, and it can meet yours, too.

Specify RoZone-RoSeal for your next job. Contact your nearest Rome Cable representative for more information—or write to Department 702 and ask for Bulletin ROT-1. Rome Cable Corporation, Rome, New York.

ROME CABLE
CORPORATION

For more facts circle 564 on Reply Card

Research Laboratory Offers Facilities to Industry for Finishing Metals, Plastics

LARGER THAN ANY of its predecessors, a research and experimental center for barrel finishing of metals and plastics was recently opened by the Lord Chemical Corp., York, Pa.

The new 40- by 120-ft plant addition contains an experimental tumbling room 40 ft wide by 73 ft long; a chemical laboratory 19 by 21 ft; office, sample-storage space; and a modern display room 38 by 19 ft to show barrels and related equipment.

The experimental barrel-finishing shop was designed and built to embody every modern concept in this method of precision finishing. Arranged in rows along the two long sides of the room are 30 barrel-finishing machines, representing every available type; horizontal octagonal, horizontal hexagonal, triple-action, tiltable, submerged, wire-mesh, wooden tumbling and wooden finishing barrels are all included.

A 1½-in. pipeline, conveniently located above each row of barrels, feeds water to the barrels through individual 1-in. lines. Quick acting valves and swivel spouts provide the amount of water needed at each barrel in the quickest possible time.

This shop can tumble workpieces from the smallest instrument pinion, weighing but a fraction of a gram, to large parts weighing 100 lb or more. Jobs that can be done here include: metal cleaning and degreasing, descaling, deburring, abrasive and non-abrasive cut-down, stock removal, fine finishing, formation of radii, coloring, burnishing, polishing, rust-inhibiting and mechanized drying.

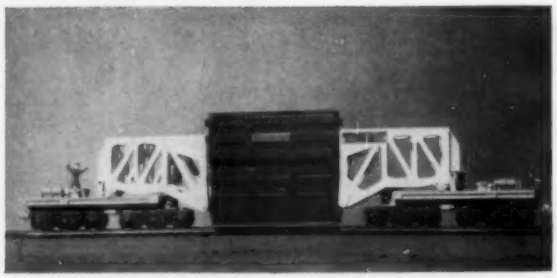
Unique Three-Part Railroad Car Designed To Transport Transformers

A RAILROAD CAR in three parts, one part being the actual load the car is carrying, has been designed by Westinghouse Electric Corporation for transporting huge power transformers.

The car is being built by the Greenville Steel Car Company of Greenville, Pa., and will be placed in operation early this summer. It has a load capacity of 500,000 lb, and will transport a unit 28 ft long and 12 ft wide.

The car is comprised of two identical sections, each about 30 ft long. Each section consists basically of an underframe with trucks, on which is mounted a steel truss. The transformer is suspended between the two trusses, forming the complete car.

Primary benefit of the new car is that the transformer can be lowered to within about 6 in. of the rails. A heavy-duty car used now for shipping the largest transformers has about 48 in. clearance between rail and car bed. The center of gravity of the load is lowered considerably, increasing load stability over that of conventional depressed-center car.



Powerful New X-Ray Machine To Explore Advanced Weapons for Navy

A NEW 2,000,000-volt x-ray installation has recently been dedicated at Concord, Calif., by the U. S. Navy. The installation will make possible the nondestructive testing of vital defense materials and structures. Castings will be evaluated with the 2,000,000-volt unit before being sent to shipyards that build missiles or nuclear-powered vessels.

The multi-million-volt unit, built by General Electric's X-Ray Department in Milwaukee, is housed in a newly erected concrete building that is large enough to permit entry of an entire railroad car or large truck. In addition to the 2,000,000-volt x-ray unit, the building houses a 250,000-volt machine, further increasing the versatility of the radiographic services centered here.

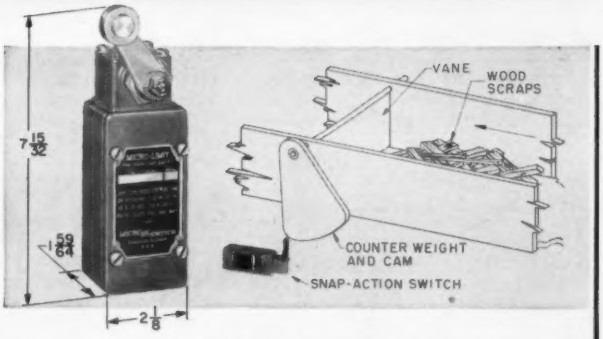
Closed-circuit TV facilities will permit remote observation of internal moving parts so that large, complex operating components can be examined without resorting to costly or destructive disassembly. A control room plus complete facilities for film processing are also included.

Construction required 1,200 cu yd of concrete. The wall separating the control and exposure rooms is concrete four feet thick, with radiation traps and lead-lined doors added for fullest protection. Other walls are a full two ft in thickness. A 66-ton door, 2 ft thick, 18 ft wide, closes the main entry whenever the unit is in operation. Interlocks prevent operation of the unit until all doors and gates are closed and locked.

MICRO SWITCH . . . FIRST IN PRECISION SWITCHING

MICRO SWITCH "ML" Switch is control limit to avoid conveyor jams

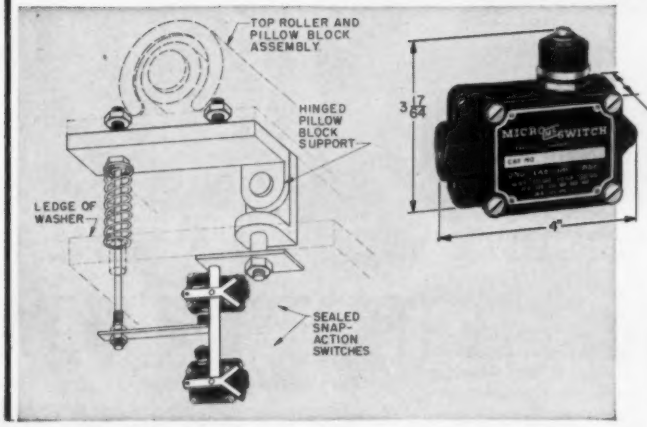
This conveyor system was designed to carry off wood scraps. A vane is constructed in the conveyor line so that material passing down the line presses against the vane in case of a jam-up. The vane is counterweighted by a sector cam made of heavy steel plate. When the lowering of the cam operates the "ML" switch, the conveyor line shuts down. The "ML" switch was selected because it is sealed against weather and permits a 60° overtravel.



MICRO SWITCH "ML" switches combine rugged construction with precise operation. Both single and two-circuit switching units are available. Electrical rating is 20 amperes 120, 240, 480 volts, ac ; ½ ampere 115 volts dc ; ¼ ampere 230 volts dc ; ¾ H.P. 110 volts ac ; 1½ H.P. 220 volts ac.

How to make your production dollar go farther—with

MICRO SWITCH PRECISION SWITCHES



Tension kept within limits by spring lever working between two switches

Fabric tension in a bleaching and dyeing machine is kept from becoming too great or too slack by the use of two MICRO SWITCH "F" switches. The switches are positioned to stop the machine in the event the material passing through the top roller becomes too tight or too loose. Slackening of the cloth brings the lever against the upper switch. Excessive tension releases the springs and the bottom switch is actuated. The Type "F" switches were selected because of their dependability and their sealed protection against moisture and dirt.

MICRO SWITCH "F" switches are long-lived precision switches with the capacity for making and breaking steady state currents of 20 amperes and switching inrush currents as high as 75 amperes.

There are thousands of applications for MICRO SWITCH switches on plant equipment. For additional information on how to use MICRO SWITCH precision switches, let us send you MICRO Tips Digest—a gold mine of profit-making suggestions.

MICRO SWITCH distributors with full stocks of switches for every plant use requirement are located near you. Look under "Switches, Electric" in the Yellow Pages.

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A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY

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NEW PLANT CONSTRUCTION — advance information on location, costs

Gadsden, Ala.—Republic Steel Corp., 1405 Republic Bldg., Cleveland, has announced a major expansion and improvement program at company's Gadsden, Ala. plant which will include the addition of a second electric steelmaking furnace. Cost of improvements to be completed by the end of this year reported to be between $8-13 million.

Oxnard, Calif.—General Foods Corp., 250 North Ave., White Plains, N. Y., plans to construct a new plant for processing frozen foods for company's Birds Eye Division. Work will get under way soon for completion in early 1958. Cost of new facility reported to be approximately $1 million.

Santa Monica, Calif.—Summers Gyroscope Co., Broadway & Cloverfield Blvds., has work under way on a modern plant and office building here. Structure with a floor area of 103,000 sq ft is scheduled to be completed in mid-year and will more than double existing floor space for company's operations. Construction of new plant and office building will involve an expenditure of $1.5 million.

Van Nuys, Calif.—Prudential Insurance Co. of America, has acquired title to 83 acres of land from a 275-acre property owned by Lockheed Aircraft Corp., 2553 N. Hollywood Way, Burbank, Calif., on which it will build a 500,000 sq ft office, manufacturing and laboratory facility. Prudential will lease them under a 25-year lease with renewal option to Lockheed for use by the company's missiles systems division. Construction will begin soon for occupancy by the aircraft company some time in late 1958. Prudential will spend $14 million on project.

New Milford, Conn.—Kimberly-Clark Corp., 4500 N. Commercial Ave., Neenah, Wis., has acquired a 100-acre plant site on which it plans to construct a new paper products mill. Preliminary construction work has already begun and plant is scheduled to be placed in operation by spring of 1958. Manufacturing plant will have a floor area of 350,000 sq ft and will represent an investment with land and equipment in excess of $5 million. W. J. Megin, Inc., Naugatuck, Conn., is the general contractor.

Wilmington, Del.—E. I. du Pont de Nemours & Co., Inc., du Pont Bldg., has authorized plans for the construction of a new plant for the manufacture of refined as well as technical grades of sodium CMC. Construction work will begin at once for completion early in 1958.

Savannah, Ga.—Union Bag-Camp Paper Corp., Woolworth Bldg., 233 Broadway, New York, N. Y., plans to construct and install its seventh paper machine and a new hardwood pulp mill at local facilities here. The new mill which will require three to four years to complete, is reported to be a multi-million dollar project.

Kellogg, Idaho—Bunker Hill Smelting Co., subsidiary of the Northwest Lead Co., 2700 16th Ave., S.W., Seattle, Wash., has announced a major expansion and improvement program of its facilities for mining and production of lead and zinc. The proposed project involving an expenditure of $15 million will go toward enlargement and modernization of company plant and equipment and of its by-products recovery facilities.

Chicago, Ill.—Clark Equipment Co., 300 Second St., Buchanan, Mich., plans to construct a new plant here. Company manufactures gasoline and electric powered carrier vehicles for industry and will use the new 300,000 sq ft facility for either a spare parts service center or a manufacturing and assembly plant. Plant located on Chicago's west side is scheduled to be in operation later this year.

Litchfield, Ill. — International Paper Co., Bagpak Div., 220 E. 42nd St., New York, N. Y., has authorized plans and work will get under way at once on new multi-wall paper shipping sack plant. The plant will manufacture both sewn and pasted bags for packaging animal feeds, fertilizers, cement and miscellaneous dry chemicals. Plant will be completed in early spring of 1958.

Peoria, Ill. — Caterpillar Tractor Co. plans to construct a new 500,000-sq ft plant for the production of large V-type industrial diesel engines. Plant will be part of a development containing a multi-building research center and a general office building on an 1100-acre site. Cost will be about $5 million.

Lexington, Ky.—Dixie Cup Co., Easton, Pa., has announced plans for the construction of new plant for the manufacture of paper cups, containers and related products. Plant site has already been cleared and construction will get under way soon for scheduled completion in the early part of 1958. Construction of the new plant will cost an estimated $2 million, plus another $1 million in new machinery and equipment.

Lake Charles, La.—Petroleum Chemicals, Inc., 806 Perdido St., New Orleans, La., a subsidiary jointly owned by the Cities Service Co. and Continental Oil Co., plans to construct a new plant for the production of butyl rubber at company site here. Plant will have an initial capacity of 30,000 tons of butyl rubber a year which will be provided at an investment cost of $17 million.

St. Francisville, La.—Crown Zellerbach Corp., a major paper producer, and Time, Inc., magazine publishers, have announced the formation of a jointly owned company for the manufacture of machine-coated printing paper. New concern, the St. Francisville Paper Co., plans to construct a new paper mill which will cost an estimated $30 million and will be completed by late 1958.

Dearborn, Mich. — Ford Motor Co., 3000 Schaefer Rd., has announced a major expansion program along with plant improvements to cost a total of $710,000,000 through 1957. Expenditure will provide added production capacity to meet increasing demand for company's products and for the manufacture of the new Edsel passenger car line. Program includes 39 new manufacturing and assembly plants, 21 parts depots, 2 proving grounds and 19 engineering and research and office buildings.

Camden, N. J.—Campbell Soup Co., 100 Market St., plans to construct a multi-million dollar food processing plant, on a 385-acre site, northwest of the city of Portage la Prairie, Manitoba, Canada. Construction of the plant will begin as soon as spring weather permits and will provide 130,000 sq ft of floor space for food processing.

Hanover, N. J.—Wilbur B. Driver Co., 160 Riverside Drive, Newark 4, N. J., manufacturers of resistance wires and alloys, plans to construct a new modern one-story manufacturing plant. Preliminary work is already under way and plant is expected to be ready for production in late 1958. Cost of land and buildings reported to be in excess of $5 million.

Grants, N. Mex.—Dow Chemical Co., 1000 Main St., Midland, Mich., has announced construction of terminal facilities here. Work is already under way on the operation expected to be in production late this year. New facility will be equipped to handle storage and distribution of 50 per cent caustic soda solution, soda ash, and other chemicals.

New York, N. Y. — Johns-Manville Corp., 22 E. 40th St., New York 16, N. Y., has announced plans for the expenditure of $35 million on plant expansion and improvement in 1957. Major expansion and modernization include new insulating board plants in Klamath Falls, Ore., and North Bay, Ont., Canada, and new asbestos cement pipe plants in Stockton, Calif. and Denison, Tex.

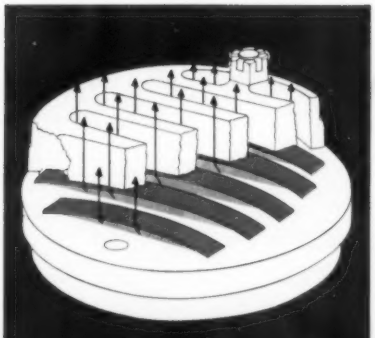
Niagara Falls, N. Y.—National Lead Company's Titanium Alloy Manufacturing Div., 111 Broadway, New York 6, N. Y., has announced a major expansion at local plant for increased

(Continued on page 240)

For more facts circle 566 on Reply Card ——→

Just a puff of air lifts the valve strip...

WORLD'S "FASTEST" COMPRESSOR VALVE!



Stainless steel strips, in red, open the Feather Valve ports by rolling contact against the lower plate. There is no impact.

It's not magic, merely a demonstration of Worthington's amazing Feather* Valve—the lightest, fastest-acting compressor valve on the market. Less than half a pound of air pressure will operate the valve in a standard two-stage 100 psi Worthington machine.

Because of its lightness and flexibility, Feather Valve action is very sharp. There is virtually no slip or back flow. Result: real savings in power costs.

No Impact. Even when operating as fast as forty times a second, the Feather Valve works with no impact. Lack of impact plus the absence of buffer plates and cushioning accessories assure long life and negligible valve maintenance.

For an on-the-spot report of a Worthington "Feather Valve" water-cooled compressor in action, see the next page.

WORTHINGTON

*Reg. U. S. Pat. Off.

Worthington Feather Valve air compressors operating at the Ford Motor Co. Plant, Cleveland, Ohio.*

HOW TO GET THE PLANT AIR COMPRESSOR YOU NEED

As in the above Ford plant, compressed air is a basic power service in most every modern industrial plant. Equipment reliability and long life are a must.

Worthington makes a complete line of water-cooled air compressors. Every machine is available in a standard unit, from the single horizontal "midgets" to the big balanced opposed "giants." This standardization allows complete freedom of choice and you can install these high quality machines at lowest possible cost in a surprisingly short time.

For more information about your compressed air needs, write Section K-71, Worthington Corporation, Harrison, New Jersey. In Canada: Worthington (Canada) 1955, Ltd., Toronto, Ont.

WORTHINGTON

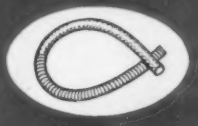
See preceding page

with the acquisition of FLEX-O-TUBE...

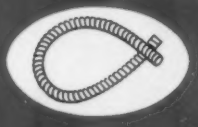
FLEXONICS CORPORATION

now offers the FIRST COMPLETE LINE of flexible hose products in all materials

FLEXON®
Metal Hose and Fittings

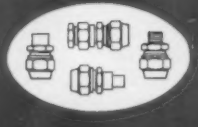


CORRUGATED HOSE
Flexon corrugated hose is the standard of the industry. Available in a variety of types in stainless steel, steel, bronze, alloys.



CONVOLUTED HOSE
Manufactured by Flexonics Corporation for over 55 years, Flexon convoluted hose is made in all commonly used types and materials.

HOSE ASSEMBLIES
A wide range of standard and special hose assemblies are manufactured by Flexonics Corporation to meet industrial requirements.

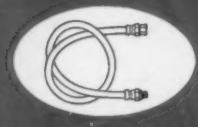


FITTINGS
A complete selection of couplings and fittings are offered for use with all types of Flexon metal hose for all services.

FLEX-O-TUBE®
Rubber and Synthetic Hose and Fittings

BULK HOSE
Flex-O-Tube bulk hose is offered in a wide range of types and sizes for handling liquids and gases for automotive, aircraft and industrial services.

HOSE ASSEMBLIES
Complete hose assemblies are furnished with a broad choice of standard and special fittings for low, medium and high pressures.



TEFLON HOSE
Teflon hose and hose assemblies are offered for use where chemical and temperature resistance and light weight are required.

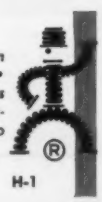
FITTINGS
Reusable, pressed on, clamp type, flange type, S.A.E. and special fittings and couplings are manufactured for all services.

Now at your service are the combined know-how and engineering and manufacturing facilities of two leading manufacturers of flexible tubing. For you, it means better service on all your fluid conveying problems.

In joining forces with Flex-O-Tube, Flexonics Corporation now offers combined experience totalling 85 years. The combined field sales and service organizations operate through 15 offices in principal industrial cities with representatives in scores of additional centers and in thirty foreign countries.

Now more than ever before it will pay you to bring your fluid conveying problems to Flexonics Corporation—the one manufacturer who can answer virtually every need.

PLANTS AT
Maywood, Illinois • Inkster, Michigan • Elgin, Illinois • Memphis, Tennessee • Rock Falls, Illinois • Savanna, Illinois • Elizabeth, New Jersey • North Hollywood, California • Brampton, Ontario • Windsor, Ontario



Flexonics Corporation
CHICAGO METAL HOSE DIVISION
FLEX-O-TUBE DIVISION

General Offices: 1340 S. Third Ave., Maywood, Ill.
In Canada: Flexonics Corporation of Canada, Limited, Brampton, Ontario
Also Manufacturers of
Expansion Joints • Bellows • Thermostats • Aircraft Assemblies and Components

For more facts circle 567 on Reply Card

LOW COST MARGIN OF SAFETY BETWEEN

DANGEROUS SLIP

SURE GRIP

Stops skids and slips *with*	Raised steel figures diamond-shaped for maximum slip-skid resistance from all directions
Get maximum wear *with*	Tough rolled steel floor plate
Easily fabricated *with*	Ordinary shop equipment
No matching problems *with*	Non directional pattern—minimum waste
Cleans, drains rapidly *with*	No maintenance problems
Solve your slipping problem *with*	A.W. Super-Diamond as independent flooring, as an overlay—or used structurally. For complete information write on company letterhead to Dept. SD-S9.

No other floor plate can match A.W. Super-Diamond's safety and durability at so low a cost.

Pattern actual size

Wherever oil, grease, or other substances raise special slipping accident hazards, we suggest a check on the special non-slip qualities of A.W. ALGRIP—the world's only abrasive rolled steel safety floor plate.

A.W. SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

ALAN WOOD STEEL COMPANY • CONSHOHOCKEN, PA.

Other Products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Hot and Cold Rolled Sheet and Strip—(Alloy and Special Grades)

For more facts circle 568 on Reply Card

why wonder?

You can be sure you're getting a ready-to-go steam trap when you buy a Nicholson . . . because each and every one is tested in actual steam service before shipment.

And that's not all. With just one thermostatically-operated moving part, there's nothing to get out of order, nothing to go wrong. Nicholson means continuous operation of your steam-using equipment . . . no downtime from trap failure.

- **high air-venting capacity . . . for faster warmup of equipment.**
- **powerful valve action . . . no mechanical linkages to cause trouble.**
- **small and lightweight . . . easy to pipe and support.**

So, to get a trap that's service-tested, and loaded with operating features, specify Nicholson. W. H. NICHOLSON AND COMPANY, 14 OREGON ST., WILKES-BARRE, PA., *Sales and Engineering offices in 98 principal cities.*

Write for Bulletin 1055

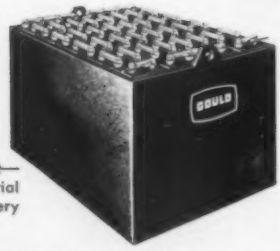
NICHOLSON
of Wilkes-Barre

For more facts circle 569 on Reply Card

Hy Peskin photo taken at Ice Follies.

You'll go "Head over Heels" for

gould *extra benefits:*



America's Finest—
Gould Industrial
Truck Battery

Largest application engineering staff to give you continuous assistance in training your new battery maintenance personnel, establishing good preventive maintenance procedures, and checking efficiency of charging methods . . . all in the interest of insuring that you get maximum long life from your Gould Batteries.

Ask for new booklet ". . . so you're going to buy an industrial battery" . . . Objective digest of what to look for. Write Gould-National Batteries, Inc., Trenton 7, N. J.

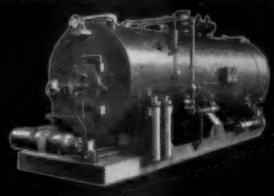
©1957 Gould-National Batteries, Inc.

Always Use Gould-National Automobile & Truck Batteries

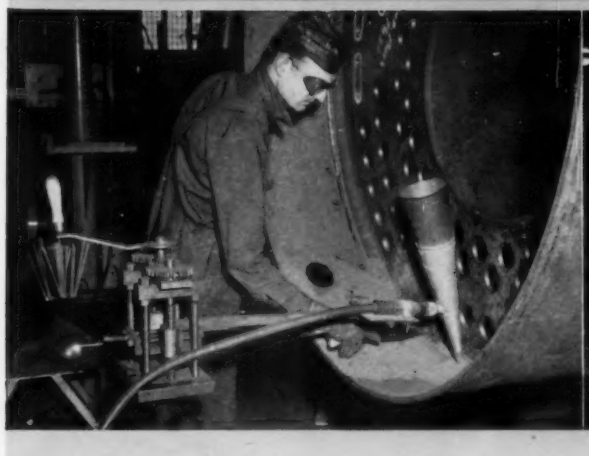
More Power to you from Gould

For more facts circle 570 on Reply Card

AMESTEAM GENERATOR

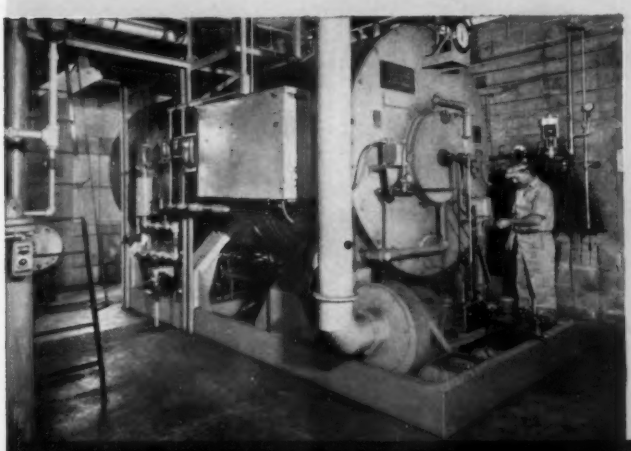


Gives you EXTRA YEARS of SERVICE



CONSTRUCTION THAT EXCEEDS CODE REQUIREMENTS goes into every step in the making of an AMESTEAM GENERATOR. Here, the tube sheet is automatically welded to the shell. Tubes are rolled and *re-rolled* after stress-relieving to insure an absolutely tight sheet and long life. The insulation jacket is 16-gauge, not the usual 24-gauge.

"FINAL EXAMINATION" which every AMESTEAM GENERATOR must pass is the fire test under conditions duplicating those of the customer's operation. All component parts are specifically designed and fabricated for AMESTEAM GENERATORS — assembled, inspected and tested in the Ames factory, not merely purchased and shipped from one point.



— PLUS EVERY OTHER FEATURE FOR RELIABLE, LOW-COST STEAM

Most important to the user is the Ames 3-pass concentric tube design — inherently efficient and simple to maintain — free of the ill effects of thermal expansion and contraction encountered in most other boilers. The maximum flexibility of the tube sheets in AMESTEAM GENERATORS occurs at the point of maximum expansion, while minimum flexibility occurs at the point of minimum expansion — a vital protection against untimely metal fatigue. Just one of many reasons why you're safe and sure when you specify "AMESTEAM GENERATOR". Write for catalog and name of your nearby Ames sales and service representative.

STRENGTH FOR THE YEARS AHEAD!

Your AMESTEAM GENERATOR is shipped in firing condition with an inbuilt bonus of durability and performance beyond standard boiler requirements. Note rugged construction of every component from skids to steam outlet — Ames "extras" that provide support and protection for the boiler during shipment and years of operation.

AMES IRON WORKS INC.

BOX M-47 OSWEGO, N. Y.

For more facts circle 571 on Reply Card

ANNOUNCING WESTINGHOUSE FLUORESCENT LAMPS WITH

ULTRALUME®

HIGH INTENSITY PHOSPHORS

START BRIGHTER...
MAINTAIN BRIGHTNESS LONGER...

- **MORE LUMENS PER WATT**—more light for your dollar
- **PLUS UNIFORM END-TO-END LIGHT** . . always perfectly color-matched maximum light output maintained throughout life . . and carrying the **WESTINGHOUSE ASSURANCE** of performance satisfaction or full purchase price refund.
- Get the most for your lighting dollar—call your Westinghouse Lamp Distributor today, or write Westinghouse Lamp Division, Dept. E4, Bloomfield, N. J.

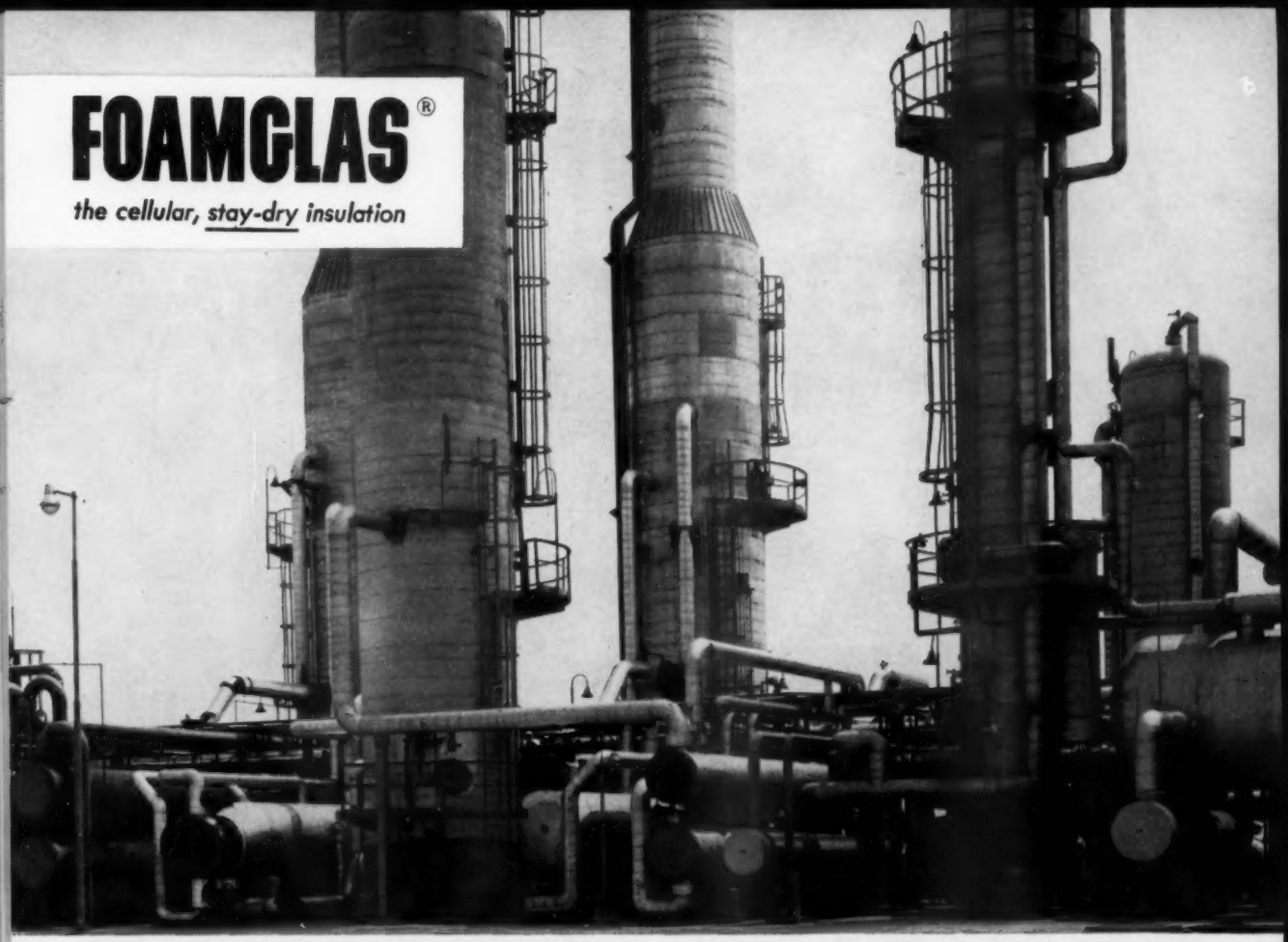
YOU CAN BE SURE...IF IT'S

Westinghouse

For more facts circle 572 on Reply Card

FOAMGLAS®

the cellular, stay-dry insulation



Photograph shows FOAMGLAS insulated low temperature piping and equipment at National Petro-Chemical's hydrocarbon extraction unit, Tuscola, Illinois. Four years' performance has proved FOAMGLAS provides constant insulating value . . . important to continuous, accurate temperature control on this outdoor equipment. Costly insulation replacement is eliminated. The net result is lower operating costs.

At National Petro-Chemicals Corporation . . .

cellular glass handles tough outdoor insulating job without deterioration

"FOAMGLAS insulation on low temperature piping and equipment proved a good investment at our Tuscola, Illinois, hydrocarbon extraction unit," state engineers for National Petro-Chemicals Corporation. "Back in 1953, we picked this all-glass insulation to insure dependable, economical operation of a reabsorber, two light oil absorbers, three flash drums and all interconnected piping. Operating temperatures range from +29° to −30° F. and the equipment is exposed to the weather."

Such conditions pose a real threat to insulation. Moisture condensation resulting from the exposed location and freezing operating temperatures could ruin a fibrous or porous insulation. But, as National Petro-Chemicals concludes: "Nearly four years of trouble-free performance has proved the dependability of FOAMGLAS. It's handled this tough insulating job without deterioration."

Inorganic FOAMGLAS is composed of millions of non-connected, sealed glass cells . . . each a permanently dry insulating unit. Its insulation value can't vary, no matter how much moisture it's exposed to. Even acid can't harm it!

Whether *you* insulate piping, equipment or plant buildings, consider the valuable combination of benefits which FOAMGLAS alone can give you. It *stays dry!* It's incombustible and acid-proof . . . dimensionally stable, rigid and unusually strong. Prove it to yourself! Send today for a free FOAMGLAS sample and directions for six simple tests you can easily perform on it. Write . . .

Pittsburgh Corning Corporation
Department PE-47, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

PITTSBURGH PC CORNING ® Also manufacturers of PC Glass Blocks

Its light weight, strength and rigidity plus the ease with which it can be cut or shaped with ordinary tools speeded the application of FOAMGLAS, helped keep installation costs down. Insulation was applied by J. F. Pritchard Company of Kansas City, Mo., who also designed and installed the process units.

For more facts circle 573 on Reply Card

Keep Work Moving **FAST!**

The Series "600" 'Load Lifter' Electric Hoist speeds production — lifts ½-ton loads at 30 FPM at the push of a button. Safe 24-volt push-button control starts this fast hoisting instantly. Two powerful, independently operating brakes are provided for extra safety. Each alone can hold the full load.

The "600" 'Load Lifter' is ruggedly built to meet industry's need for long-term hoisting economy and freedom from costly maintenance. Servicing is easy and safe in the air. No need to take the hoist down. Power and operating costs are low because the "600" mechanism is simple and frictional losses are minimized.

If you want lug or hook suspension, plain trolley or motor-driven trolley — you can have the "600" 'Load Lifter' to fit the need. Also available are current collectors, conductor cord trolleys and other devices to give you efficient, money-saving hoisting equipment from a single source. Capacities ½ and 1 ton. *Ask your "Shaw-Box" Distributor for complete details or write us for Bulletin 408.*

Series "600" 'Load Lifter' Electric Hoist with motor-driven trolley. Trolley available separately for hoists already in service. Installation takes only two hours with common tools.

'Load Lifter' Jib Cranes. Self-supporting. Full revolving. Swing easily on ball bearings. No binding. A hoist on this crane can serve a 550 sq. ft. area. Capacities to 5 tons.

Cord Reels to keep the hoist conductor cord taut and up out of the way of work and worker. Also useful for small cranes and other devices with motors up to 1 HP.

57 F-1

MAXWELL MANNING & MOORE INC. M&M TRADE MARK

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.

SHAW-BOX CRANE & HOIST DIVISION

362 West Broadway • Muskegon, Michigan

Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Other Divisions produce 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

In Canada: *Manning, Maxwell & Moore of Canada, Ltd., Avenue Road, Galt, Ontario.*

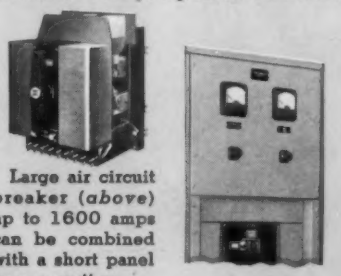
For more facts circle 574 on Reply Card

SQUARE D's NEW Unit Substation

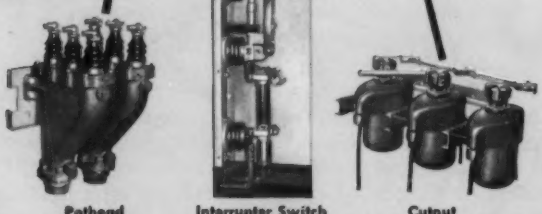
IN POWER-STYLE CONSTRUCTION

Designed to match Square D's Power-Style switchboards and control centers, these new Unit Substations meet NEMA, ASA, and AIEE standards. Available from 75 to 500 KVA; in primary voltages up to 4800V; secondary up to 600V.

Molded case circuit breakers (*left*) up to 800 amperes and QMB Saflex fusible switches (*right*) up to 600 amperes are available in compact panel construction.

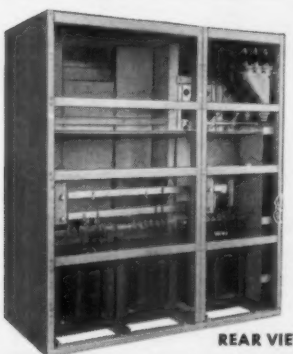


Large air circuit breaker (*above*) up to 1600 amps can be combined with a short panel in one section.



Pothead | Interrupter Switch | Cutout

Potheads, fused or unfused load break air-interrupter switches and fused or unfused oil-filled cutouts are available. Air-interrupter switches and cutouts are easily accessible from front of Substation.



REAR VIEW

3 single phase, dry-type transformers individually mounted on base in ventilated enclosure—heating and vibration held to a minimum. Transformers easily accessible for maintenance and inspection. When no air circuit breaker or metering equipment is used, entire area at top left is available for pull box.

NOW...EC&M PRODUCTS ARE A PART OF THE SQUARE D LINE!

SQUARE D COMPANY

For more facts circle 575 on Reply Card

what happens to your dust?

AIR POLLUTION...

OR...

Kentile, Inc., found a Dracco Multi-Bag Filter to be the ideal solution to air pollution problems created by an inadequate cyclone-type collector. Filter collects ½-ton of dust daily from processing of Kentile Cork Tile.

If your dust is being exhausted to the atmosphere, you may be wasting valuable materials . . . or violating air pollution ordinances.

But if it's being collected by a Dracco Multi-Bag Filter, you can breathe easy. Dracco Filters collect 99½-100% of all dust particles and exhaust only clean air with no visible dust to the atmosphere.

Kentile, Inc., Brooklyn (N. Y.) installed a Dracco Multi-Bag Filter to avoid trouble with city officials. An old-style cyclone-type collector was being used to collect dust from cutting, slitting, grinding and finishing operations in the production of Kentile Cork Tile for walls and floors. Larger particles were being trapped, but fine dust—*over half-a-ton a day*—was escaping. By installing a Dracco Filter engineered to exact job requirements, Kentile now prevents air pollution. Dusty air is carried from the cyclone through a large pipeline into the heart of the filter, collected in the hoppers and bags, then automatically discharged for convenient disposal.

If your plant is polluting the atmosphere with dust, or if you have any other dust problems, check with Dracco for a cost-saving switch from problems to profits.

DRACCO CORPORATION
4035 East 116th Street • Cleveland 5, Ohio

Bulletin 800 is Dracco's 40-page catalog on dust control and recovery. Contains detailed facts and figures on all dust control equipment. For your copy, write Dracco today.

DRACCO *airstream* conveyors
dust control equipment

For more facts circle 576 on Reply Card

Do you worry about power distribution problems

AT 3:00 A. M.?

If you have a power distribution system problem — either in an old building or in that new one you're planning — here's one way you can stop losing sleep over it. Just use Rockbestos A.V.C. (asbestos, varnished-cambric insulated) Interlocked Armored Cable. It will help you cut costs and at the same time assure you dependable service. Here's why:

- Rockbestos A.V.C. Interlocked Armored Cable gives you more current capacity than cable in conduit or other armored cable. Single conductors are standard N.E.C. Type AVA power cables.
- You save important dollars by eliminating the need for costly conduit or ducts.
- It's easily installed on racks or hangers beneath the ceiling or next to walls.
- It can be installed up, down or around walls, beams or posts.
- It cuts installation time and permits quick, easy repairs.

Get all the details on Rockbestos A.V.C. Interlocked Armored Cable — Write now for catalog which gives complete specifications and application data.

ROCKBESTOS PRODUCTS CORPORATION

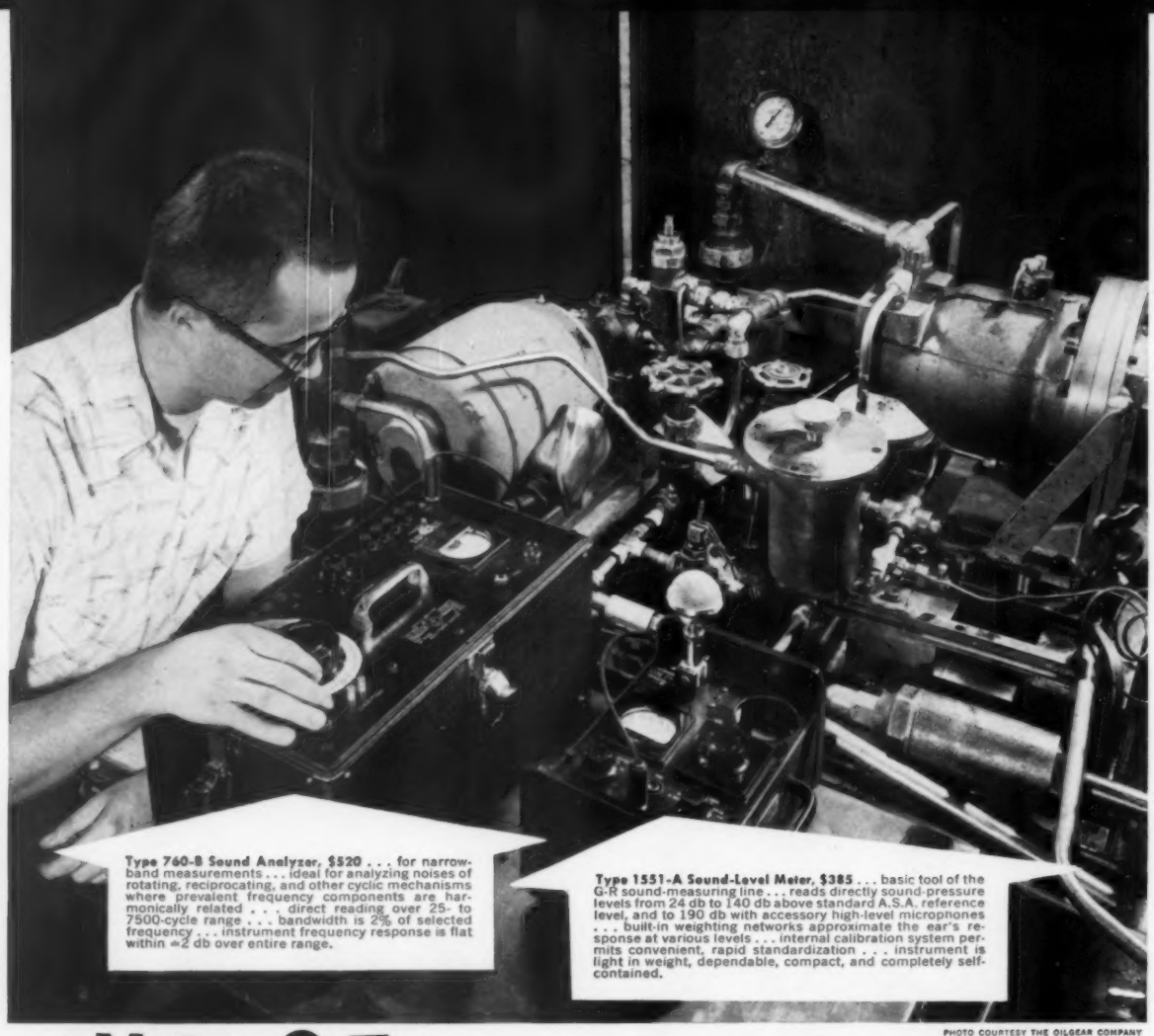
NEW HAVEN 4, CONNECTICUT | NEW YORK, CLEVELAND, DETROIT, CHICAGO, PITTSBURGH, ST. LOUIS, LOS ANGELES, NEW ORLEANS, OAKLAND, SEATTLE

ROCKBESTOS

A. V. C. Interlocked Armored Cable

For New Buildings, Expanding Existing Circuits, Relocating Old Circuits

For more facts circle 577 on Reply Card



Type 760-B Sound Analyzer, $520 . . . for narrow-band measurements . . . ideal for analyzing noises of rotating, reciprocating, and other cyclic mechanisms where prevalent frequency components are harmonically related . . . direct reading over 25- to 7500-cycle range . . . bandwidth is 2% of selected frequency . . . instrument frequency response is flat within ±2 db over entire range.

Type 1551-A Sound-Level Meter, $385 . . . basic tool of the G-R sound-measuring line . . . reads directly sound-pressure levels from 24 db to 140 db above standard A.S.A. reference level, and to 190 db with accessory high-level microphones . . . built-in weighting networks approximate the ear's response at various levels . . . internal calibration system permits convenient, rapid standardization . . . instrument is light in weight, dependable, compact, and completely self-contained.

PHOTO COURTESY THE OILGEAR COMPANY

NOISE an important factor in Product Sales Appeal

Unwanted sounds emitted by modern-day products must not constitute a hearing hazard — nor must such noise interfere with the efficiency or comfort of the user. Manufacturers of home appliances find noisy products meet sales resistance. Producers of heavy industrial machinery and equipment have similarly learned that noise must be kept to tolerable levels.

The importance of noise control is becoming increasingly recognized. At The Oilgear Company, fluid-power pumps, motors, transmissions, and accessory products must meet definite performance standards where noise levels are concerned. While these specifications are set forth increasingly by customers themselves, this is to a degree unnecessary — *every* unit produced is tested, regardless, for conformance to minimum noise level standards. Management well understands that noise is one more important criterion determining the market position of their product.

At the Oilgear laboratories, the General Radio Sound Analyzer is used in conjunction with the G-R Sound-Level Meter. Here, sound-level data vs. fluid-power pump load and stroke help establish safe operating limits. Studies determine the relationship between discrete frequencies and the various pump components. Information obtained through analysis of the frequency spectrum not only aids in designing better products, but eventually serves as a useful guide in the trouble shooting of pumping equipment malfunctions.

Increasingly, sound measurements and analyses are being used by industry. Sound measurements can be an important tool in Product Design and Quality Control . . . Safeguarding Against hearing Damage . . . Maintenance . . . and Sales Promotion. Such measurements may be of help to you!

WRITE FOR THE SOUND BULLETIN . . . for A Complete Description of General Radio Sound-Measuring Instruments Available For This Work.

GENERAL RADIO Company

275 Massachusetts Avenue, Cambridge 39, Mass., U.S.A.

Broad Avenue at Linden, Ridgefield, N. J. **NEW YORK AREA** — 920 S. Michigan Ave. **CHICAGO 5**

8055 13th St., Silver Spring, Md. **WASHINGTON, D. C.** — 1150 York Road, Abington, Pa. **PHILADELPHIA**

1000 N. Seward St. **LOS ANGELES 38** — 1182 Los Altos Ave., Los Altos, Calif. **SAN FRANCISCO**

All G-R Products are now covered by a *2-Year Warranty*

For more facts circle 578 on Reply Card

Automatic DOCKER...THE LIFT TRUCK THAT WORKS WHERE OTHERS CAN'T

Shortest in its class... unmatched for easy maneuvering ...and for efficient low-cost operation

PAPER—Marcal Paper Company slashes loading time per boxcar from 12 man-hours to 1½ man-hours. DOCKER illustrated is equipped with rotating paper roll clamp for unloading and tiering 800 lb. paper rolls.

Illustrated are only a few examples of the DOCKER'S versatility. This extra-compact, more maneuverable truck offers more advantages than any other of its type for materials handling in any industry. It is especially desirable where space is limited... works with ease inside trailers, freight cars and in aisles too narrow for other similar trucks.

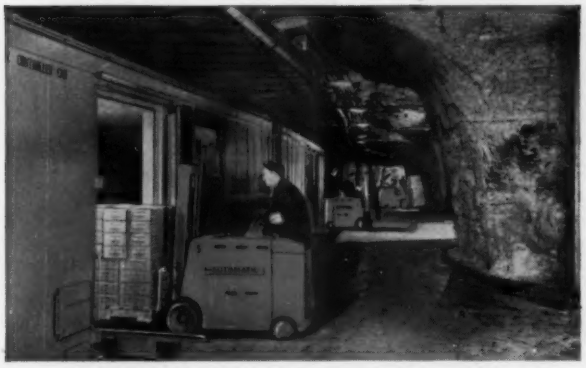
What's more, direct comparison shows clearly how definitely superior the DOCKER really is. Here are the figures:

	DOCKER	TRUCK A	TRUCK B	TRUCK C
2000 LBS. WITH LOAD LENGTH OF	48"	30"	40"	30"
SHORTER..... OVERALL LENGTH LESS FORK	53⅞"	65⅞"	65½"	64"
SAFER-EASY ON, EASY OFF..... STEP HEIGHT	7"	13"	13¾"	13⅞
MORE PRODUCTIVE..... LIFT SPEED F.P.M.	65	55	45	45
MORE VERSATILE..... GRADE CLEARANCE	45%	43.4%	45%	35%
MORE MANEUVERABLE... TURNING RADIUS	56"	59"	64"	57"
MAXIMUM HEAT PROTECTION. CLASS H, SILICONE INSULATED MOTORS—ALL MODELS	Yes	No	No	No

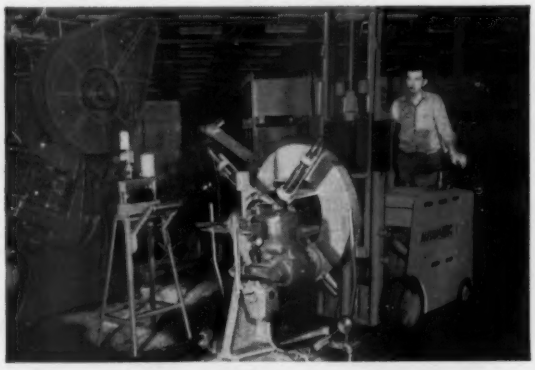
Send today for complete information including case histories of installations similar to your own.

Automatic

Dept. D-7, 105 West 87th Street
Chicago 20, Illinois



FOOD AND COLD STORAGE—Operating in temperatures ranging from plus 38° to minus 10° F. dependable Automatic DOCKERS working around-the-clock speed handling of perishable foods for Inland Storage Co. Fifteen cars at a time can be unloaded at the above dock deep inside this mammoth "deep freeze."

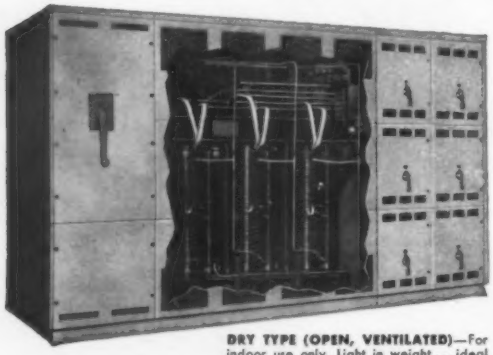


FABRICATED METALS—DOCKER is placing steel coil on an automatic feed device for a punch press in the new Briggs and Stratton Plant, Milwaukee. Throughout this plant, which is a model for plant planners, DOCKERS keep materials moving from receiving through production to shipping.

For more facts circle 579 on Reply Card

WAGNER UNIT SUBSTATION TRANSFORMERS

will assure continuous dependable power for years to come!



DRY TYPE (OPEN, VENTILATED)—For indoor use only. Light in weight . . . ideal for multi-storied buildings . . . no fireproof vaults necessary.

Nothing is more important to your plant than an uninterrupted flow of power. You can't afford to be handicapped by a system that is unable to meet expanding demands.

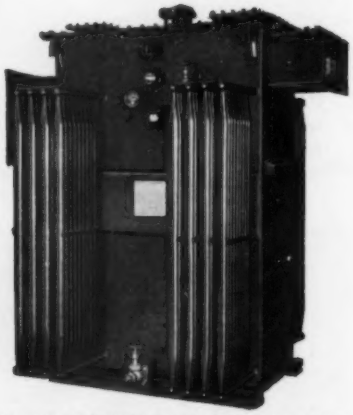
It will pay you to check over your distribution system—find out how adequate your transformers are for present and *future* load requirements.

And it will pay you to specify Wagner PREDESIGNED Transformers for your load-centers. You will save time—save job engineering costs—and get liberally designed transformers with the switchgear of your choice. Wagner PREDESIGNED Transformers are engineered to meet heavy industrial demands. They are built in standard ratings which are coordinated with the specifications of unit substation builders.

Bulletins TU-205 and TU-214 give full information on Wagner Unit Substation Transformers for industrial power needs. Write for your file copies today.

CLOSE-COUPLED. These transformers fit flush against switchgear enclosures, eliminating throats and saving space . . . available in ratings from 500 through 2000 kva.

NITROGEN-FILLED. These Class H. Silicone Insulated Transformers offer many advantages in maintenance and safety. Suitable for indoor or outdoor use . . . completely fireproof. In ratings up to 2000 kva.



OIL AND NOFLAMOL-FILLED. Oil-filled transformers are generally used outdoors. Noflamol type is filled with a noninflammable liquid making it especially suitable for locations where explosive liquids and gases are present.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6492 Plymouth Ave., St. Louis 14, Mo., U.S.A.

737-S

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

For more facts circle 580 on Reply Card

Now — A Revolutionary NEW Steam Trap!

INSTALL IT — FORGET IT!

ACTUAL SIZE

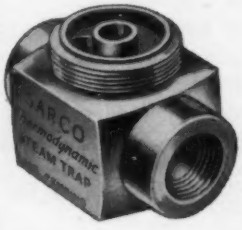
SO RUGGED **SO SIMPLE**

this steam trap practically eliminates maintenance

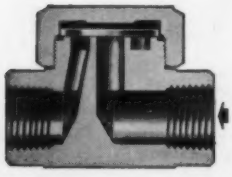
1. A CAP

2. A DISC

3. A BODY



That's all!



Major advance in trap design!

Imagine a steam trap machined from a solid block of stainless steel. A trap with only 3 parts...cap, disc and body...and not even a valve-closing mechanism — the kinetic energy of steam closes the valve and ONLY the TD uses this new operating principle.

That's the revolutionary new Sarco type TD. It has only one moving part...a hardened SOLID stainless steel disc. And it is not affected by superheat, water-hammer, corrosive condensate. That's why we can say INSTALL IT—FORGET IT!

Use the SAME trap for 10-600 psi...for light or heavy loads ...without seat or valve change or other adjustments. Closes tight on no load—no steam waste.

Ask for a 60 day trial installation of Sarco TD trap and strainer...write for bulletin 257. Sarco Company, Inc., Empire State Bldg., New York 1, N. Y.

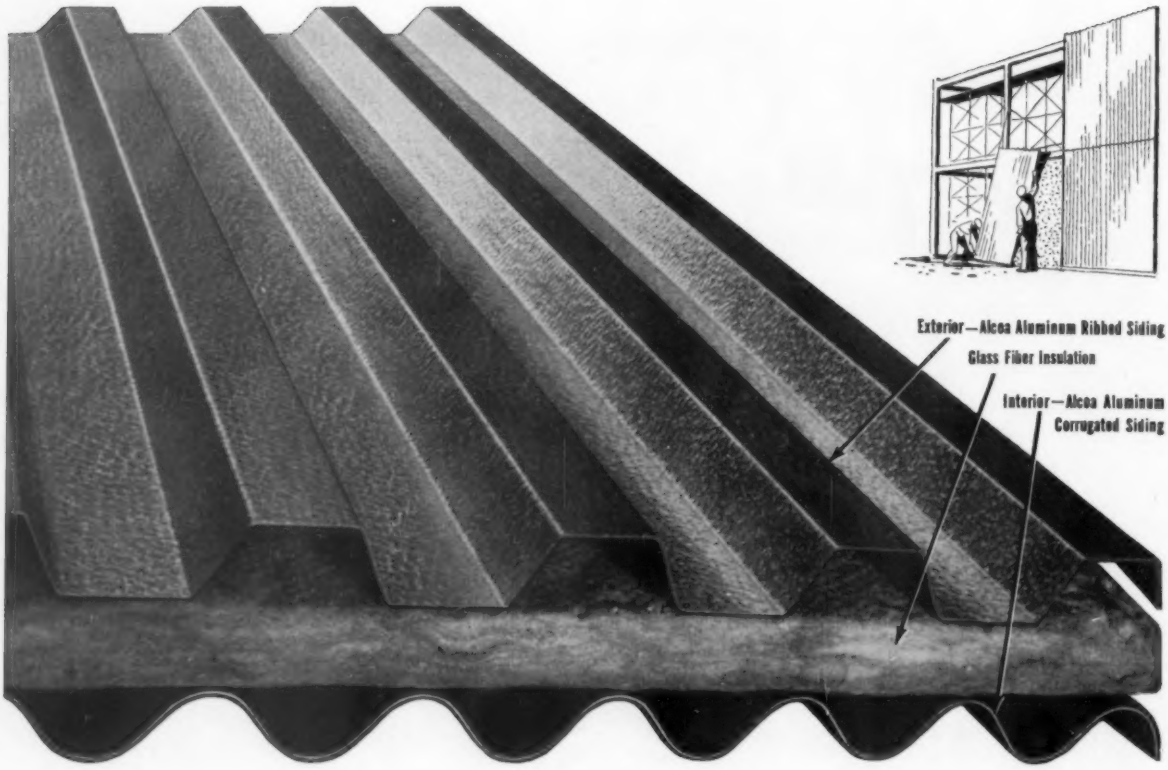
2180-B

SARCO

Only Sarco Makes All 5 Types

That's why Sarco can give impartial advice on proper steam trap selection.

For more facts circle 581 on Reply Card



Field-erected insulated sandwich walls of ALCOA® ALUMINUM cost averages $1.35 per square foot

With Alcoa Aluminum Industrial Building Products, you can erect walls with a .155 U factor . . . equivalent to three times the insulation value of an 8-inch masonry wall. And the cost will average about $1.35 per square foot.

These walls consist of two sheets of Alcoa Aluminum sandwiching a 1-inch board of glass fiber insulation. Weldable studs can be used to fasten sandwich walls to purlins or girts.

Field-erected, these insulated walls go up faster, with less man power and at lower cost than masonry. Their light weight helps reduce construction costs for steelwork and foundations. They never need painting. Industrial fumes can't hurt them. They're mighty good looking.

If you plan to cool these buildings, you have another important advantage: aluminum's high reflectivity helps keep the inside temperature lower. This means lower cooling costs. In winter, it means lower heating costs.

Alcoa will be glad to put you in touch with selected Alcoa Approved Applicators who offer a complete service in the erection of low-cost aluminum sandwich walls. Just contact the nearest Alcoa sales office, listed under "Aluminum" in your phone book. Or write Aluminum Company of America, 858-D Alcoa Building, Pittsburgh 19, Pa.

THE ALCOA HOUR
TELEVISION'S FINEST LIVE DRAMA
ALTERNATE SUNDAY EVENINGS

Your Guide to the Best in Aluminum Value

ALCOA ALUMINUM
BUILDING SHEET
ALUMINUM COMPANY OF AMERICA

For more facts circle 582 on Reply Card

A new line of Standard Oil greases

RYKON

GREASE

Major breakthrough in grease technology results in development of new thickening agent. New grease has greater high temperature stability, superior multi-purpose qualities, improved lubricating properties.

Standard Oil instituted a grease research and development project several years ago. The result of this work is the line of RYKON Greases, which contain a unique new non-soap, organic thickening agent.

RYKON Greases surpass in stability and performance the best greases made up to this time. They bring to industry new opportunities for improved machine performance. They greatly reduce the maintenance and grease handling problems encountered in industry.

RYKON Grease properties

RYKON Greases are smooth, buttery-textured greases, made from the finest quality, solvent-extracted oil. Their thickening agent is a Standard Oil exclusive. RYKON Greases have these high-quality characteristics:

High temperature stability—Better heat stability than any other petroleum oil grease. ASTM dropping point of 480°F. Maintain consistency in service at high temperatures.

Mechanically stable—Maintain consistency even under severe mechanical working in service.

Chemically stable—Inhibit oxidation. Oil and thickening agent in combination possess extremely good chemical stability.

Wide temperature range—Lubricate at high and low temperatures. Extended range of application thus obtained makes RYKON Greases truly multi-purpose.

Water resistance—Do not lose consistency in presence of water. Highly resistant to water washout.

Oil separation—Minimum bleeding of oil in service and storage.

Anti-rusting—Exceptional natural rust preventive characteristics.

With RYKON Greases, lubrication can become simple, foolproof and less expensive—much less expensive, perhaps, than a single shut down caused by equipment failure due to the use of the wrong type of grease or the use of an "economy" grease lubricant.

RYKON Greases come in four Regular and three Heavy-Duty grades. Thus there is a RYKON Grease to take care of every grease lubrication job. Using RYKON Greases plant-wide can reduce your grease storage requirements, simplify lubrication maintenance training, cut down record keeping, save on dispensing equipment and reduce investment in grease inventories.

Get more facts about RYKON Greases. Call your nearby Standard Oil industrial lubrication specialist in any of the 15 Midwest or Rocky Mountain states. Or write Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

Check Chart Of RYKON Greases

Regular Line	Grade Consistency
RYKON Grease No. 0	0
RYKON Grease No. 1	1
RYKON Grease No. 2	2
RYKON Grease No. 3	3
Heavy Duty Line	
RYKON Grease No. 0 E. P.	0
RYKON Grease No. 1 E. P.	1
RYKON Grease No. 2 E. P.	2

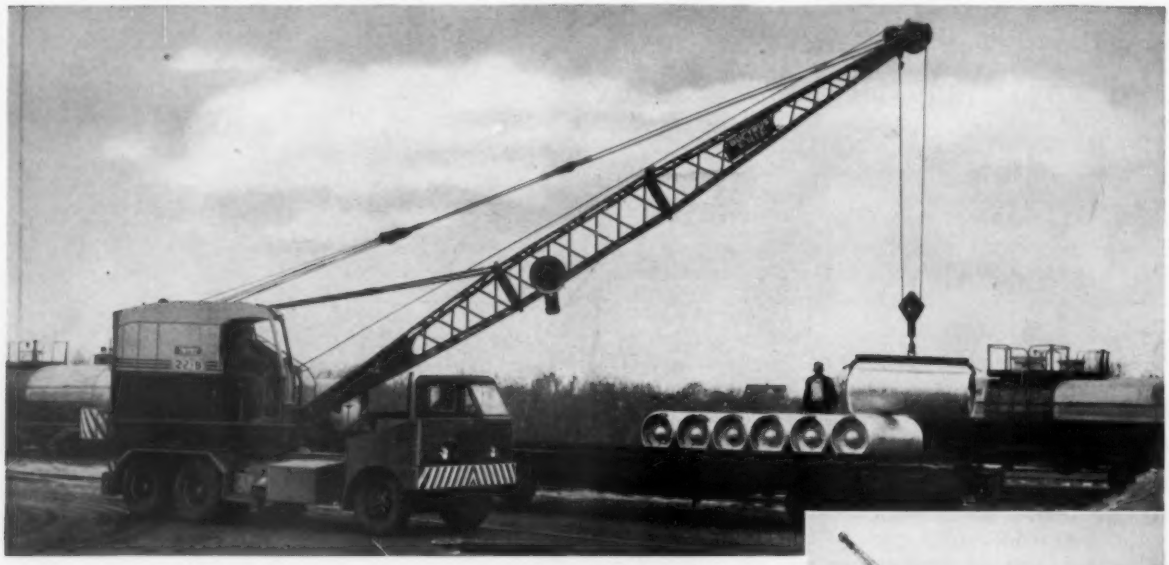
STANDARD

STANDARD OIL COMPANY (Indiana)

For more facts circle 583 on Reply Card

One of these 22-B Cranes Answers YOUR Handling Needs

Whether you are handling materials in widely scattered locations, over difficult terrain, or in close quarters, there is a Bucyrus-Erie 22-B crane which will do an outstanding job of handling your particular situation. Each has the power, long reach, and solid construction that help you save money through efficient, long-term service. 253E56



22-B TRANSIT CRANE

Reach and Mobility

Combining heavy-duty lifting crane features with rubber-tired mobility, the 22-B Transit Crane handles booms from 30 feet (standard) to 80 feet (with removable inserts), has lifting capacity of 25 tons. Job-to-job moves are fast and convenient.

HEAVY-DUTY 22-B CRANE

Heavy Work

An outstanding performer wherever extra strength and stability are vital, the Heavy-Duty 22-B has high maneuverability on rough or soft terrain. It is equipped with a 35-ft. boom, extendible to 70 feet through use of inserts. Long, flat crawlers with 30-in. treads, friction swing brake, power controlled lowering for the main hoist line, and telescopic pipe boom stops are only a few of its many features.

22-B CRANE

General Service

For a variety of jobs requiring highly dependable service, the standard 22-B crane can't be topped. Carrying a 35-ft. boom extendible to 70 feet, this machine has high maneuverability and great stability as well as independent power boom hoist and many other features you ordinarily find as optional equipment on other cranes.

For complete information on any one or all of these models, see your local Bucyrus-Erie distributor or write direct.

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

For more facts circle 584 on Reply Card

For more facts circle 585 on Reply Card

ONE OF THE GARLOCK 2,000

Wet and Dry Tests Prove...

GARLOCK 662 GASKET MATERIAL
does not shrink or change shape

Here's convincing proof that gaskets of Garlock 662 can stand varying climatic conditions without drying, shrinking, or hardening. The gaskets illustrated were subjected to a 24-hour alternating wet and dry test for weeks, then conditioned at room temperature. As the photo and chart at right show, 662 gaskets returned to their original shape and to within 1% of their original thickness. Competitive types hardened, twisted, and shrank as much as 8%. No wonder so many companies are specifying 662 for use against gasoline, water, and oil at temperatures up to 300°F. It is approved by Underwriters' Laboratories, Inc., for use against hazardous liquids.

And longer-lasting 662 Gasket material is only one of "the Garlock 2,000" . . . two thousand styles of gaskets, packings, and seals to meet all your needs. It's the only complete line. It's one reason you get unbiased recommendations from your Garlock representative.

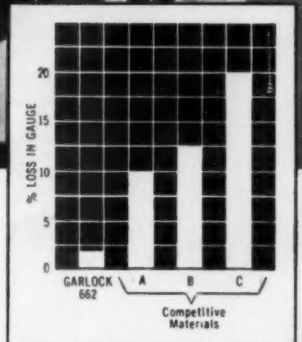
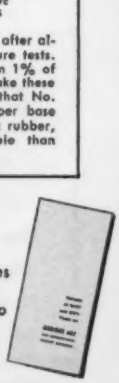


Chart shows loss of thickness after alternating wet and dry exposure tests. Garlock 662 returns to within 1% of original thickness. You can make these tests yourself. You'll prove that No. 662, made from a cork paper base impregnated with a synthetic rubber, is dimensionally more stable than competitive products.

Write for this folder AD159 which completely describes how these Wet and Dry Tests were made . . . it also contains actual samples of 662 Gasket material before and after testing.



THE GARLOCK PACKING COMPANY, Palmyra, New York

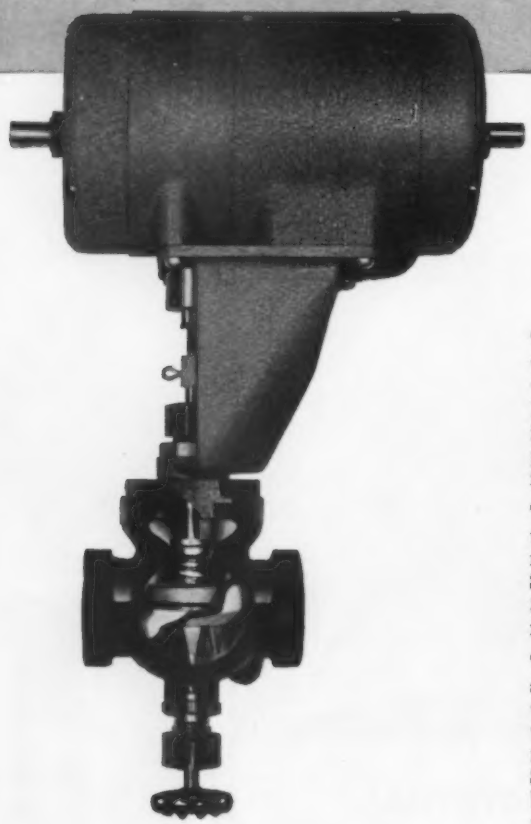
For Prompt Service, *contact one of our 30 Sales Offices and Warehouses throughout the United States and Canada.*

GARLOCK

Packings, Gaskets, Oil Seals, Mechanical Seals, Rubber Expansion Joints, Fluorocarbon Products

NEW ACTIONATOR*

heavy duty electric motor for operating valves, dampers, louvers



The new Honeywell ACTIONATOR* is a compact, lightweight, rugged and flexible industrial motor for operating valves, dampers, louvers, and other final control elements. Models for boss mounting or with integral valve yoke for installation on slip stem valves. Internal strain release protects valve seats and gear train. Squared shaft ends facilitate actuating lever attachment.

The ACTIONATOR is available in reversing or unidirectional models for on-off or two-position control, and in reversing models for floating or proportional control. Shaft rotation can cover up to 350 degrees in 7½, 10, 15, 30, 60, or 120 second timings, depending on model; torque ratings to 200 pound-inches, depending on motor speed.

The proportional control model provides slidewire resistances of 135, 500 and 1000 ohms, and can be used with any type of proportional controller. A second slidewire can be used for retransmission, to operate another motor, or for remote indication. If preferred, SPST and SPDT auxiliary switches can be installed within the end bells. The enclosed terminal compartment is designed to meet J.I.C. standards.

Specially designed MICRO SWITCH switches allow the ACTIONATOR to be used where ambient temperatures range from 25 to 150 F.

For complete information and specifications on the new ACTIONATOR, call the nearest Honeywell office, or write (send coupon) to:

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Phila. 44, Pa.

Industrial Division
MINNEAPOLIS-HONEYWELL REGULATOR CO.
Wayne and Windrim Avenues, Philadelphia 44, Pa.

☐ Please send me additional information on the ACTIONATOR.

☐ I'd like a Honeywell sales engineer to discuss applications of the ACTIONATOR in my plant.

Name_____

Title_____

Company_____

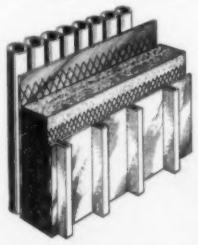
Address_____

MINNEAPOLIS **Honeywell**

First in Controls

*Tradename Minneapolis-Honeywell Regulator Co.

For more facts circle 586 on Reply Card

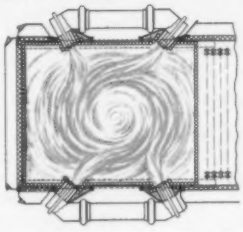


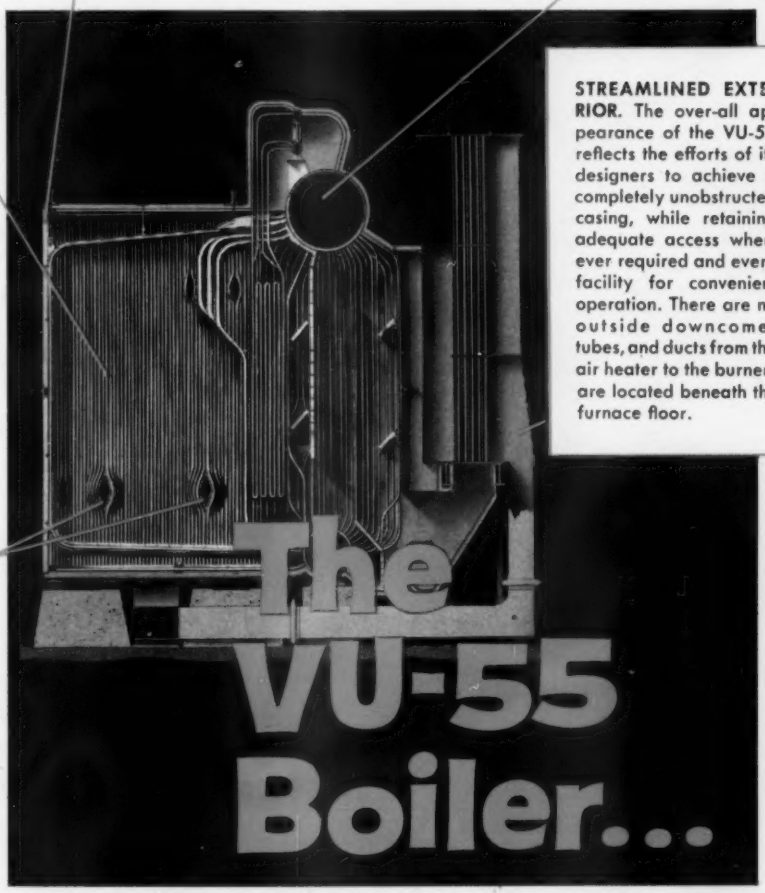
DOUBLE WALL, PRESSURE-TIGHT CASING. The latest development in casing construction for pressure firing of boilers in the size class of the VU-55, this casing is designed to assure life-time tightness with minimum heat loss. Pressure firing permits the elimination of an induced draft fan with its attendant operating and maintenance costs. Construction consists of tangent tubes backed up successively by welded steel panels, 4 inches of high quality insulating material and an outer steel casing formed as shown to provide adequately for expansion and assure ample strength. Low heat loss and the tightness required for pressure firing are assured by this double-wall construction.

HIGH STEAM QUALITY. Equipped with a large (60-in.) steam drum, the VU-55 has generous water capacity and steam reservoir space. C-E drum internals assure high quality steam at all ratings.

TANGENT FURNACE TUBES. The VU-55's furnace tube arrangement provides complete heat-absorbing, water-cooled protection on all furnace walls. Furnace maintenance is minimized, refractory expense is eliminated, heat absorption rates per sq. ft. are higher.

TANGENTIAL FIRING. More than 20 years of application experience have established the exceptional advantages of tangential firing. About 90 per cent of Combustion's large utility installations use this advanced method of firing. Flame streams from the four burners impinge upon one another at high velocity, as shown, creating a turbulence unattainable by any other method of firing. The result is rapid and complete combustion. As the gases spiral upward, they sweep all furnace heating surfaces, assuring a high rate of heat absorption.





STREAMLINED EXTERIOR. The over-all appearance of the VU-55 reflects the efforts of its designers to achieve a completely unobstructed casing, while retaining adequate access wherever required and every facility for convenient operation. There are no outside downcomer tubes, and ducts from the air heater to the burners are located beneath the furnace floor.

The VU-55 Boiler...

Custom Features, Standard Sizes, Advanced Design

The VU-55, newest of the C-E line of Vertical Unit Boilers, represents the closest approach to central station performance yet achieved in standardized boilers in its capacity range.

Its design combines a number of time-tested and service-proved features, such as Tangential Burners, double wall, pressure-tight casing, and tangent furnace tubes. In addition, this bottom-supported unit requires no outside supporting steel, is economical of space and streamlined in appearance.

It is available in 5 sizes for capacities from 50,000 to 120,000 lb per hour. It is designed for 3 pressure ranges (250, 500 and 750 psi) and can be equipped with a superheater to provide temperatures up to 750 F. Either a tubular or a regenerative air heater is available.

The VU-55 Boiler is symmetrical in design, performs efficiently over a wide range of output, and is easy to operate and maintain.

It is, in fact, the boiler with the custom features and the advanced design.

COMBUSTION ENGINEERING

Combustion Engineering Building • 200 Madison Avenue, New York 16, N. Y.

Canada: Combustion Engineering-Superheater Ltd.

B-978A

all types of steam generating, fuel burning and related equipment; nuclear reactors; paper mill equipment; pulverizers; flash drying systems; pressure vessels; soil pipe.

For more facts circle 587 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

Use the Reader Service Cards provided on pages 247-248 to ask for more information on these products. Circle item numbers of products in which you are interested.

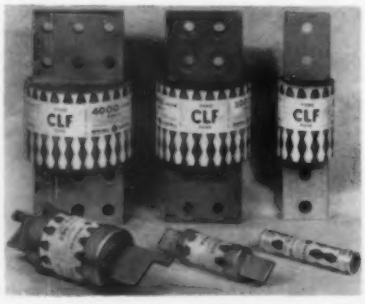
1—LIFT PLATFORM requires no installation

The Porta-Contact Lift is described as a self-contained, semi-portable industrial lift platform requiring no installation. It can be used anywhere, indoors or outdoors, and its suggested applications include loading materials from one floor level to another, dock loading, bridging spaces between buildings and docks, and production line handling. The basic Porta-Contact has a 6-by-9 ft platform and supports 5000 lb of load at 2500 lb per axle. Other platform sizes and capacities are available for loads up to 100,000 lb. In operation, the platform is powered by a compact pumping unit that operates without air. Raised height of basic platform is 64½ in. Lowered it is 4½ in. from floor. Autoquip Corp.

2—CURRENT LIMITING FUSES of high interrupting capacity

This line of current limiting fuses is announced as having a tested interrupting capacity of 200,000 amp symmetrical. Designed to interrupt short-circuit currents in less than ¼ cycle, the Type CLF Fuses are for protection of branch feeders, lighting circuits, motor starters, control power circuits and similar applications where most fuses do not have sufficient capacity. Ratings will be 6 to 4000 amp.

The CFL Fuse is announced as a one-time, low voltage, cartridge-type unit with external mounting dimensions meeting the pertinent NEC requirements and UL standards. The fuse body is an insulating tube reported to offer strength and resiliency. Silvered copper ferrules or knife blades at each end fit any standard NEC fuse holder of corresponding voltage and current rating, 600 amp and below. Above 600 amp, tangs are provided for bolt mounting. A fusible silver element is embedded in inert granular quartz filler and connected from ferrule to ferrule. It is explained that when the fuse functions, the arc that occurs is cooled by the quartz and extinguished without expulsion of gases or materials from the tube. General Electric Co.

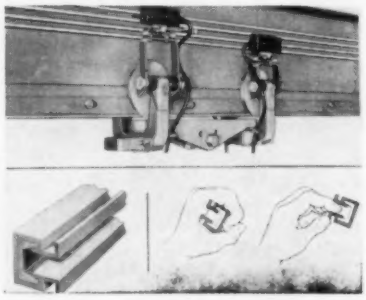


3—LIGHT BULBS burn more than twice as long

These "extended service" light bulbs have a 2500-hr life as compared to 750 to 1000 hr for most general service light bulbs, according to manufacturer. They will be available in a range from 25 to 1500 w. As in the case of all incandescent lamps with longer life, light output must be sacrificed for prolonged service, company points out. They will be furnished in 120 v and 125-130 v. The 2500-hr life was selected as the most economical for use in hard-to-get-at locations, and is reported particularly suited to group replacement programs. It is noted that many lighting installations include bulb locations where a slight reduction in light output can be tolerated to achieve longer bulb life; in these, the new bulbs will reduce maintenance costs by cutting number of bulb changes required. Westinghouse Electric Corp.

4—FLOW LUBRICATOR sends oil to inaccessible points

This pressure sight flow lubricator is designed to deliver lubricating oil or other liquids under pressure, in accurately measured quantities, to high or otherwise inaccessible points. It is available as a single unit or in multiples to 15, depending on the number of feeds required. Each lubricator making up a multiple unit is capable of feeding fluid in amounts varying from several drops to 2 pt per minute by simple adjustment of individual needle valves. Single lubricators are available with ¼ or ⅜ in. ips inlet and outlet. Inlet sizes of multiple units range to ¾ in. ips with ¼ or ⅜ in. ips outlets. All are designed for 125 psi maximum working pressure. Wm. W. Nugent & Co., Inc.



5—PVC SHIELDING protects monorail electrification

By covering its standard bus bar electrification with polyvinyl chloride extrusion, this company says it can now furnish completely safe electrified monorail systems. Named Kant-Shock, this shielding acts to prevent accidental contact with live bus bars. It is claimed impossible for an adult's finger to enter the shield. A new type sliding shoe collector provides a floating contact throughout a monorail system regardless of misalignment due to bent bars or at switches and interlocks, it is noted. Kant-Shock Shielded Electrification is mounted in stamped bracket assemblies for live power feed throughout the system at a maximum rating of 600 v, 100 amp. It can be applied in the field, where headroom permits, to existing installations of this company's monorail systems. The American MonoRail Co.

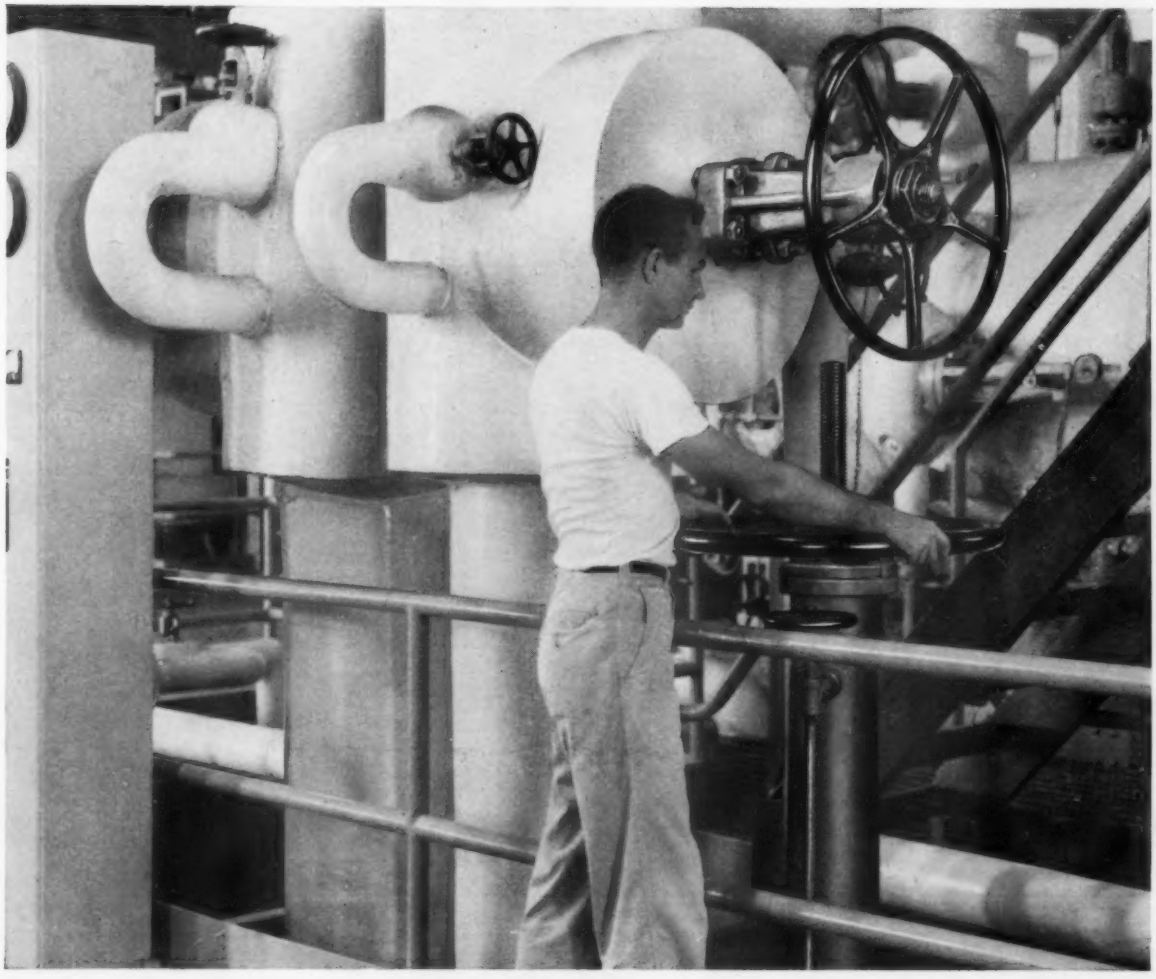
6—CLEANER removes inks, grease from aluminum

Aluminum Cleaner No. 164 is announced as a non-foaming cleaner which removes identification inks, grease, oils, and other heavy soils from aluminum. The cleaner is compounded to clean without foaming in agitated tanks; even without agitation its ability to remove difficult soils is claimed excellent. Used at 6 to 8 oz per gal of water, at temperatures between 160 and 180 F, solutions of the cleaner are reported safe on aluminum and its alloys. Oakite Products, Inc.

7—ROOFING COMPOUND makes roofs last longer

Glasstite, a protective roof coating, is a liquid glass compound claimed to add years to the life of any roof and remain watertight at least 12 yr without renewal. It is explained that Glasstite contains a binder of fiberglass which spreads like a strong spider web, permanently binding the compound together. Company says Glasstite provides a tough, non-cracking, yet flexible leathery surface on any roof, and

How Crane Steel Valves Cut Power Piping Costs



Everything's O.K. below—since 1942

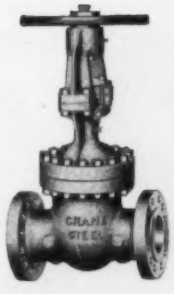
Always smooth, always positive in action—says the operator of this Crane 10-inch, 600-pound steel gate valve with extension yoke . . . and never a sign of leakage at the seats or bonnet joint.

That's the way this valve has performed for 15 years—since it was installed in a main steam cross-over line in the Nueces Bay Station of Central Power & Light in Corpus Christi. It's on working pressure of 400 psi at 830 deg. F.

The cost-in-service record of the valve is clean. It has not been touched by a mechanic except for ordinary routine servicing. Indications are it will remain in the line for a long time to come.

Unusual performance? Not for Crane steel valves. They're famous for cutting power piping costs. They're better suited for such service because of quality castings made in Crane's own foundry—with closely controlled heat-treating techniques . . . exacting machining, assembling and testing procedures that are unique with Crane.

You can be sure of low-cost steel valve performance when you specify Crane. Get all the facts from your Crane Representative or write to the address below.



CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill.—Branches and Wholesalers in All Areas

For more facts circle 588 on Reply Card

NEW PRODUCTS

(Begins on page 168)

may also be used as a protective coating on storage tanks and pipes.

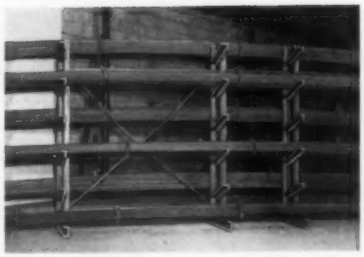
The compound is available in 5-gal drums, enough to cover about 200 sq ft. According to manufacturer, Glasstite is easily applied to dry surfaces, is as fireproof as paint, dries in 12 hr, stands temperatures from –25 to 140 F. It comes in black or aluminum—the latter suggested for hot areas, as it throws off heat. Glasstite may be applied over a previous roof coating, provided rough spots have been smoothed over. Mallard Mfg. Corp.

8—GATE VALVES have increased dimensions

Longer end-to-end dimensions are announced for this manufacturer's cast steel gate valves for butt welding. This applies to 150-lb cast steel models in sizes from 2 through 24 in., in wide use in power plants and petroleum and chemical processing. According to company, the increase in dimension offers greater protection to seating areas against heat distortion during the welding of line connections. The new dimensions are reported to comply with proposed ASA Standard B16.10. A 2-in valve will now measure 8½ in. end-to-end, for example, and a 24-in., 32 in. end-to-end. Crane Co.

9—SOLDER COMPOUND for faster, easier soldering

Flux-'N-Solder trade-names a series of compounds of finely powdered pure solder suspended in an active flux. As described by the company, just paint on—heat—and the joint is soldered. Using any type of heat such as flame, induction or hot plate, Flux-'N Solder is said to speed sweat soldering, assembly soldering, and tinning or solder coating. Flux and solder are applied in one motion by dipping or brushing. Packed in 1 lb cans at about $2.50 for 50/50 solder in general use flux. Johnson Mfg. Co., Inc.



10—BAR STEEL RACK for the heavy duty work

This bar steel rack is capable of performing heavy duty tasks efficiently and economically, it is announced. The durable, lightweight rack possesses capacities of 1500 lb per support arm, company says, and is made in multiples of 35 or 70 in. spreader between uprights. Racks may be set up to hold any varied length of bars. Artco Corp.

11—CONTROL DEVICE guards against overheating

For fast-acting precision control of critical temperatures necessary to many processing operations, the Model HL 15-10 acts to cut off the heat supply if a predetermined temperature, set on the calibrated scale, is exceeded. Bulb temperature is indicated on the scale at all times. Snap acting switch in the control circuit is the manual reset type. It is explained that once the temperature has risen to the predetermined set point, and the switch has broken the control circuit, the circuit cannot be re-established until the manual reset button has been pressed.

A second switch has been provided in series with the control switch. This second switch is normally closed and designed to open only if the temperature should drop to a point below lowest expected ambient temperature. This is provided as a fail-safe feature, as any loss of fill in the thermal element will cause a drop in indicated temperature. Scale and element ranges are 0 to 900 and 0 to 1100 F. Bulletin 311 gives data. The Partlow Corp.

12—MOBILE LIFT can reach up to 42 ft above floor level

This hydraulically-operated lift emphasizes ease of positioning, speed of elevation, and safety. It can be used indoors or out, is easily transported, company says, and folds up to pass through doorways, narrow corridors, in and out of elevators. Screw-type leveling jacks at each corner serve to hold lift in a steady, level position. Large swivel-type casters permit mobility. A ladder provides access to platform in the down position. Mechanic has complete control for raising, stopping, and lowering by means of a push-button control located on platform's guardrail. The platform is 2 ft 3 in. by 2 ft 3 in., has a rated load at 350 lb, and 3-ft high guardrails. It can be rotated through 360 deg. Six standard models, for maximum reach from 19 to 42 ft, are available; all have 110-v, 60 cycle single phase pump motor plus hand-operated pump for use in areas where electric power is not available. The Ballymore Co.

13—WIDE-ROLL CUTTER makes pipe cutting easier

Easier, better pipe cutting with a power drive, is announced for the Ridgid 202 Wide-Roll Cutter for heavy duty use. Extra wide roll built into the 202 cutter features double the bearing surface on pipe. The wide roll sets and holds revolving pipe at a perfect right angle, it is noted, to assure quick, clean starts for tracking and straight cuts. Changes to special rolls are not necessary, company points out. Larger screw handle provides for easier cutting adjustment. An extended shank protects screw threads from damage by power drive support bar, and gives greater thread bearing surface for easy turning into the pipe cut. The Ridge Tool Co.

14—STEAM-TRACED PIPING offers new advantages

Lower cost and higher efficiency of steam-traced piping is reported possible with the improved Unitrace, a method of heating product pipe lines. An extruded aluminum pipe with integral steam passage,

Unitrace was oval in shape when introduced in 1953. Now this one-piece steam-traced piping has been re-designed with a cross-section matching four standard pipe sizes from 1½ to 4 in. Besides lower cost per foot and faster installation, the new design is claimed to increase transfer of heat internally and cut heat-loss of external radiation. Aluminum Co. of America.

15—CONTROL SWITCH for use in hazardous locations

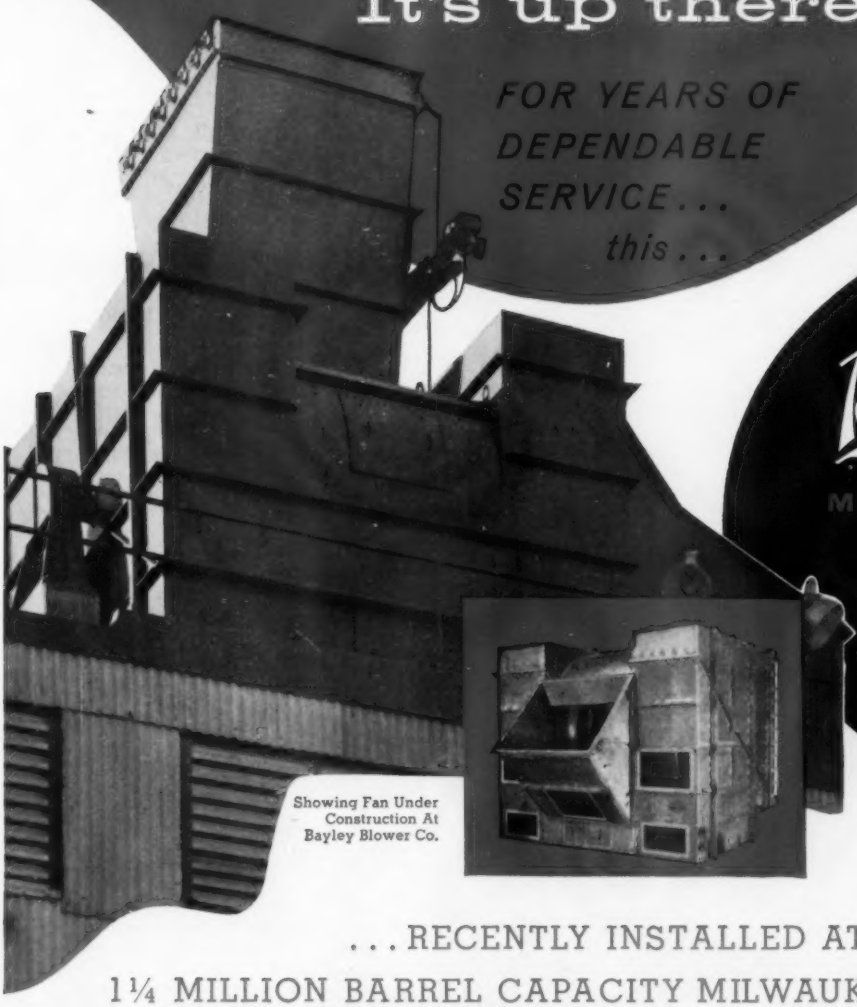
An explosion-proof electrical switch which can be used as a free cable "on and off" control switch in hazardous spots is announced for use with company's electrically rewound hose reels for in-plant liquid or gas delivery or fire protection. The switch is claimed waterproof and weathertight. Sealed into it is a 5-ft length of Type SO cable with two No. 18 conductors and one No. 18 ground wire. Compact and lightweight, it is supplied with terminals and fitting, and two types of mounting brackets are available. Manufacturer says it is UL approved for Class I, Groups C and D, for d-c pilot duty 24 v maximum. It can be mounted on or near a hose reel, or be used as a free-cable switch. Clifford B. Hannay & Son, Inc.

16—PVC BALL VALVES handle many difficult fluids

This valve combines company's "double-seal" ball valve design principle with material suited for handling corrosive and

It's up there...

FOR YEARS OF DEPENDABLE SERVICE... this...



Showing Fan Under Construction At Bayley Blower Co.

Bayley

R.D.D.

MEDIUM-SPEED INDUCED

DRAFT FAN

...RECENTLY INSTALLED ATOP THE NEW 1¼ MILLION BARREL CAPACITY MILWAUKEE PLANT OF THE MARQUETTE CEMENT MANUFACTURING CO.

First of its type in the U. S., this large medium-speed BAYLEY-built mechanical draft fan is specially designed to induce air through cement clinkers, during processing operations at Marquette Cement Mfg. Company's new Milwaukee plant. The open air installation is typical of today's trend in mechanical draft installations.

Due to particularly severe performance demands in cement processing, Bayley's high standards of craftsmanship assure longer, more dependable fan service life . . . a fact attested to by the many instances in which BAYLEY equipment has been selected by the leading producers in the industry.

Engineered Air Handling Equipment

Bayley ... BLOWER COMPANY

1825 South 66th St. Milwaukee 14, Wisconsin

WRITE for *Bayley FAN-O-GRAPHICS*—A Guide for Specifying and Operating Centrifugal Fans.

For more facts circle 589 on Reply Card

only circuit breakers
can be tested
...and tests prove
Westinghouse AB breakers
protect at the precise rating
you need

breaker protection is *sure* and *accurate*

YOU CAN BE SURE... IF IT'S Westinghouse

J-90232A

For more facts circle 590 on Reply Card

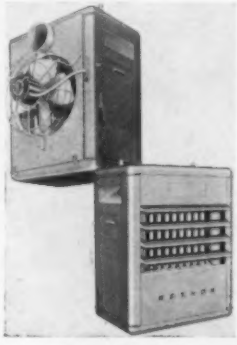
NEW PRODUCTS

(Begins on page 168)

other difficult fluids. It is suggested for use in many plastic or metal piping systems for vacuum or pressure service. Full flow, quarterturn shutoff, with thousands of leaktight cycles and no maintenance are features claimed. Valve seats are replaceable. Rating is 150 psi at ambient temperatures and 50 psi at 130 F. Sizes ½ to 2 in. in screwed ends are now available. Flanged and weld ends and larger sizes are planned. Jamesbury Corp.

17—UNIT HEATER looks good fore and aft

The 1957 model of this company's suspended gas unit heater is announced as the first with completely modern design —back as well as front—and as the first with automatic two-speed fan control. Recognition of the fact that the back of a unit heater is seen as often as the front, led this manufacturer to dress up the



back of the heater. All controls are in one group within the cabinet, readily reached for servicing by removal of an access panel on the side. The fan motor is mounted to the wire fan guard.

Company's Flexi-Temp control system, introduced last year, on floor heaters, is optional on five suspended models from 25,000 to 100,000 Btu capacity. Use of this control system minimizes temperature fluctuation and closely approaches continuous air circulation, it is reported. On this new model the winter/summer fan switch is of the toggle type with pull cord. This switch by-passes the electric valve and lets the fan be operated independently for cooling air circulation during hot weather. Reznor Mfg. Co.

18—POWER TRANSMITTER is solenoid operated

Rapid stop-start machine operation can be remotely or automatically controlled with the Type J, a solenoid operated power transmitter, it is announced. The transmitter is designed primarily for use in driving conveyors, high production machine tools, and other machinery. Manufacturer claims that 40 or more starts per minute are possible when driving machines with reasonably low inertia. The new motor uses a constantly running

For more facts circle 591 on Reply Card——→

WHAT?

AB-I's prevent single phasing?

SURE! No more motor burnouts or other equipment damage caused by fusible protective devices opening only one phase in a polyphase circuit. With a Westinghouse AB-I circuit breaker, *all* lines are opened *every* time on circuit faults. A common trip bar breaks all contacts simultaneously. If you are going to provide protection for equipment, it makes sense to provide *complete* protection. Circuit breakers not only prevent "single phasing", but they are sealed at the factory so that unauthorized personnel can't enter and "bridge" circuits. Then, too, you know that Westinghouse circuit breakers will operate properly because every one is completely tested at the factory.

Too expensive? NO! In many cases, Westinghouse AB-I circuit breakers actually cost less than safety switches.

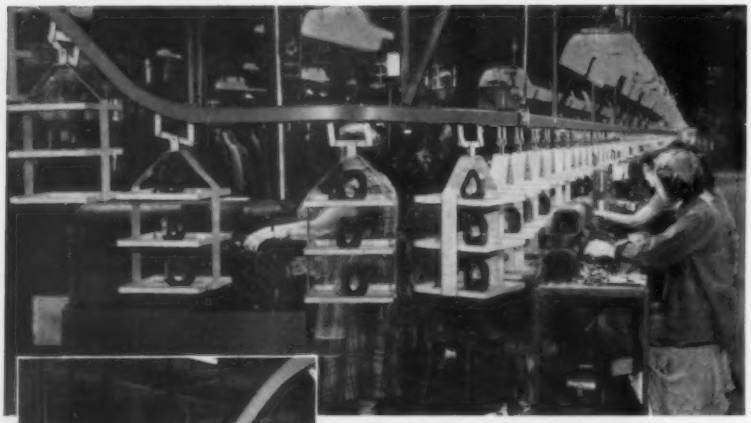
Get the complete story from your Westinghouse distributor. Ask him for Descriptive Bulletin 30-250 or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-30268

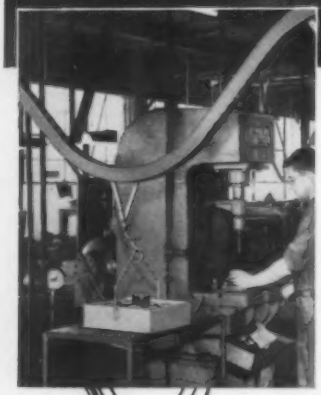
YOU CAN BE SURE...IF IT'S

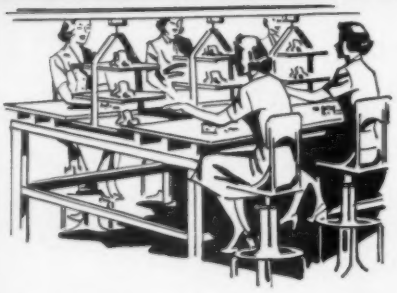
Westinghouse

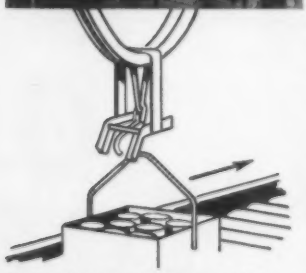
R-W "Zig-Zag"® CONTINUOUS POWER CONVEYORS

provide real AUTOMATION for COST-SAVING OPERATION & INCREASED PRODUCTION









The above photo and line drawing demonstrate how the R-W "Zig-Zag" Conveyor *automatically* picks-up full trays and *automatically* deposits them at the unloading station. Machine operator starts cycle by merely sliding full trays into the conveyor path.

The above photos illustrate how various materials handling problems on the machining and assembly lines were effectively solved, for an electric motor manufacturer, with R-W "Zig-Zag" Conveyors. "Stuffing-Trays" carry a continuous supply of work to assemblers seated on both sides of a huge bench and just as easily carry the finished assemblies on to other operations in the plant. This "Zig-Zag" system utilizes available overhead space to increase production efficiency and provides for a saving of valuable floor space. R-W "Zig-Zag" Conveyors are flexible, easy to install, easy to alter or expand, economical to operate and offer longer, safer, more efficient materials handling service on any production line.

WRITE TODAY—
for complete information request Catalog No. A-93R.

Leading manufacturer of Track Hangers, all types of hardware and Electric Door Operators for over 75 years.

Richards-Wilcox
MANUFACTURING COMPANY
Materials Handling Division

460 W. THIRD STREET, AURORA, ILLINOIS • Branches in Principal Cities

For more facts circle 592 on Reply Card

NEW PRODUCTS

(Begins on page 168)

motor-driven flywheel with a short throw clutch, the latter actuated by two solenoids arranged in tandem and normally supplied for 115 v, 60 cycles. One engages the clutch and the other the brake. Control is accomplished by a stop-start pushbutton station, or can be automatic through use of limit switches, sensing devices, timers or other controls. The Type J is a totally enclosed, fan-cooled unit with pre-lubricated ball bearings. (It is also available without solenoid control.) Diehl Mfg. Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

19—NAMEPLATE DECALS for difficult surfaces

Type I Nameplate Decals are said to adhere instantly and permanently to any commercial surface, including acrylics, polyethylene, unpainted metals. Although water applied, these decals do not depend on water solubility for adhesion, it is pointed out, and accidental oversoaking will not affect adhesion qualities. They can be designed with colorful halftones or in simple poster style, but are presently available only in larger production line quantities. The Meyercord Co.

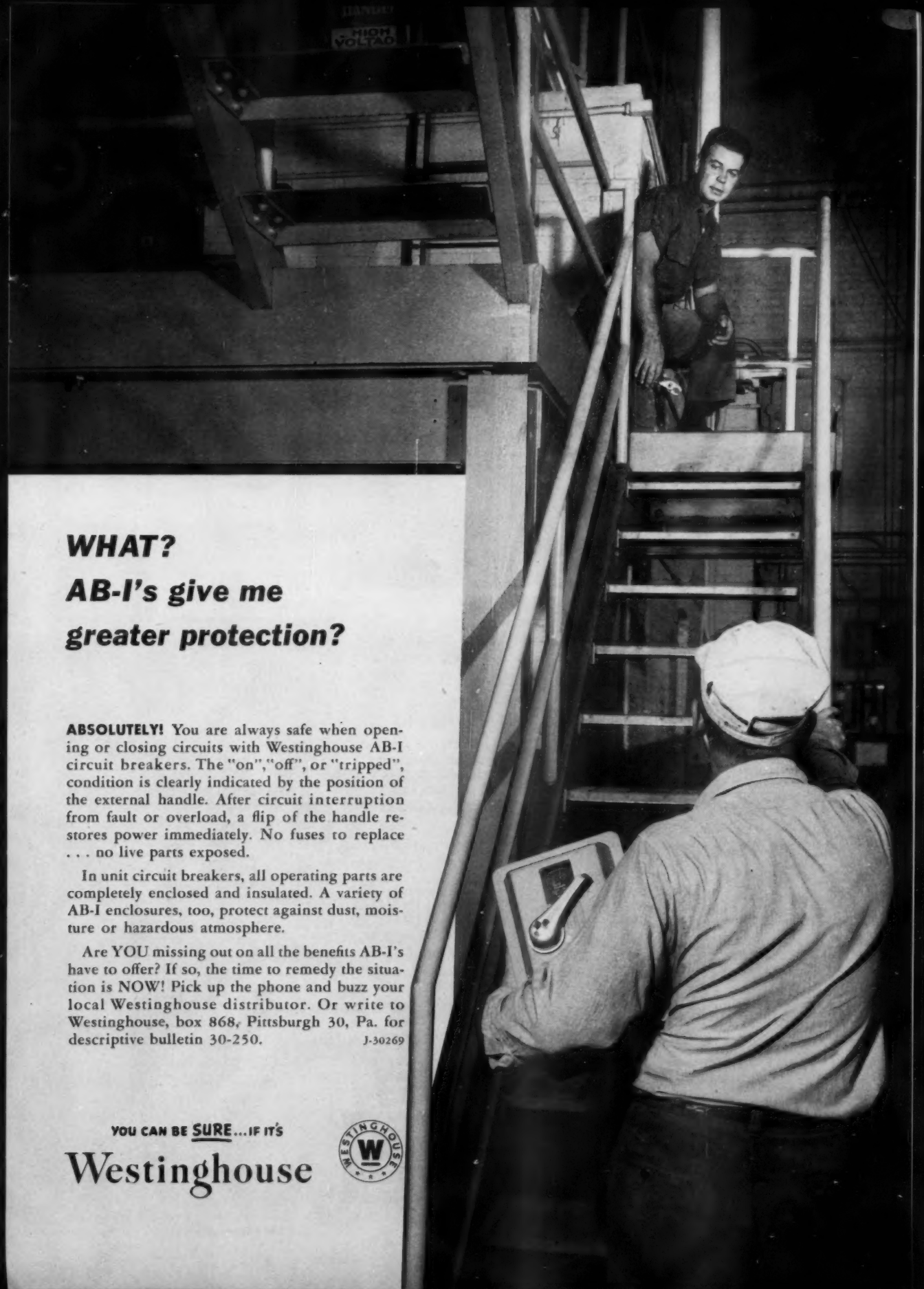
20—VIBRATING FEEDER has pneumatic mechanism

Instead of using electric vibrators or motors, this feeder has its vibrating force generated by a pneumatic drive mechanism. The unit is completely metallic. Manufacturer says its operation is feasible under conditions of high temperature and corrosion normally damaging to many types of feeders. A wide variety of bulk materials like sand, gravel and small parts can be carried by the feeder, it is claimed, and even fine powders and cement. Some materials can be fed at an uphill slant of 20 deg. According to manufacturer there is only one moving part in the drive mechanism, and the enclosed construction seals out dirt and foreign matter. Rates of feed are adjustable. Vibration frequency is selected by varying operating air pressure over a range of 30 to 90 psi, providing control of feed rates. The Cleveland Vibrator Co.

21—HEATER applies burner directly to the scroll

The Torrid Heater is a direct-fired gas heater combining both fan and mixing chamber into one compact unit. In it, the burner is applied directly to the scroll. The fan is of the conventional non-overloading type with corresponding burner

For more facts circle 593 on Reply Card——→



WHAT?
AB-I's give me greater protection?

ABSOLUTELY! You are always safe when opening or closing circuits with Westinghouse AB-I circuit breakers. The "on","off", or "tripped", condition is clearly indicated by the position of the external handle. After circuit interruption from fault or overload, a flip of the handle restores power immediately. No fuses to replace . . . no live parts exposed.

In unit circuit breakers, all operating parts are completely enclosed and insulated. A variety of AB-I enclosures, too, protect against dust, moisture or hazardous atmosphere.

Are YOU missing out on all the benefits AB-I's have to offer? If so, the time to remedy the situation is NOW! Pick up the phone and buzz your local Westinghouse distributor. Or write to Westinghouse, box 868, Pittsburgh 30, Pa. for descriptive bulletin 30-250. J-30269

YOU CAN BE **SURE**...IF IT'S

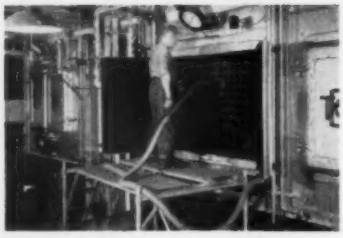
Westinghouse

HOW SPENCER VACUUM SERVES INDUSTRY

With permanently installed systems piped throughout the plant . . . with rugged, reliable portables . . . Spencer Vacuum is industry's modern "tool of many uses".

FLOOR CLEANING

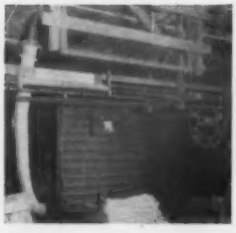
CLEANING



BOILER CLEANING

Maintenance is speeded, sanitation improved when high suction Spencer vacuum is on the job. Special applications reduce plant operating overhead, too. Vacuum cleaning of boiler tubes and furnaces, for example, increases operating efficiency up to 20%.

CONVEYING



Rapid, sanitary handling of dry and free flowing materials in granular or pulverized form is accomplished with Spencer vacuum. Units from 2 through 100 HP, capacities up to 10 tons per hour.

SPEEDING PRODUCTION

BENCH WORK

Reclaiming materials manually or automatically . . . vacuum chucking . . . removing chips, threads or bristles . . . aiding automation on assembly lines . . . these are just a few production-speeding applications of Spencer Vacuum.

REQUEST CATALOG 155.

SPENCER HARTFORD

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

For more facts circle 594 on Reply Card

NEW PRODUCTS

(Begins on page 168)

equipment that can be selected for the service intended. According to manufacturer, the Torrid Heater was developed to meet the need for a standard package of oven heater and air replacement unit that can be economically purchased, operated and maintained. It is furnished as a standard installation and, when installed with safety and control equipment recommended, it is reported to give almost attention-free service. Minimum floor space requirements are a further advantage claimed.

For use as a make-up air heater, the unit is available in sizes up to 100,000 cfm and 10,000,000 Btu. The oven heating unit is reported effective for intake air temperatures up to 700 F. A convection type heater, it acts to rapidly circulate heated air through the oven with control over temperature and oven ventilation. Sizes in this unit range to 35,000 cfm and 8,000,000 Btu. David-Ludwig Co.

22—LIGHT DOCK BOARD self-adjusts to truck level

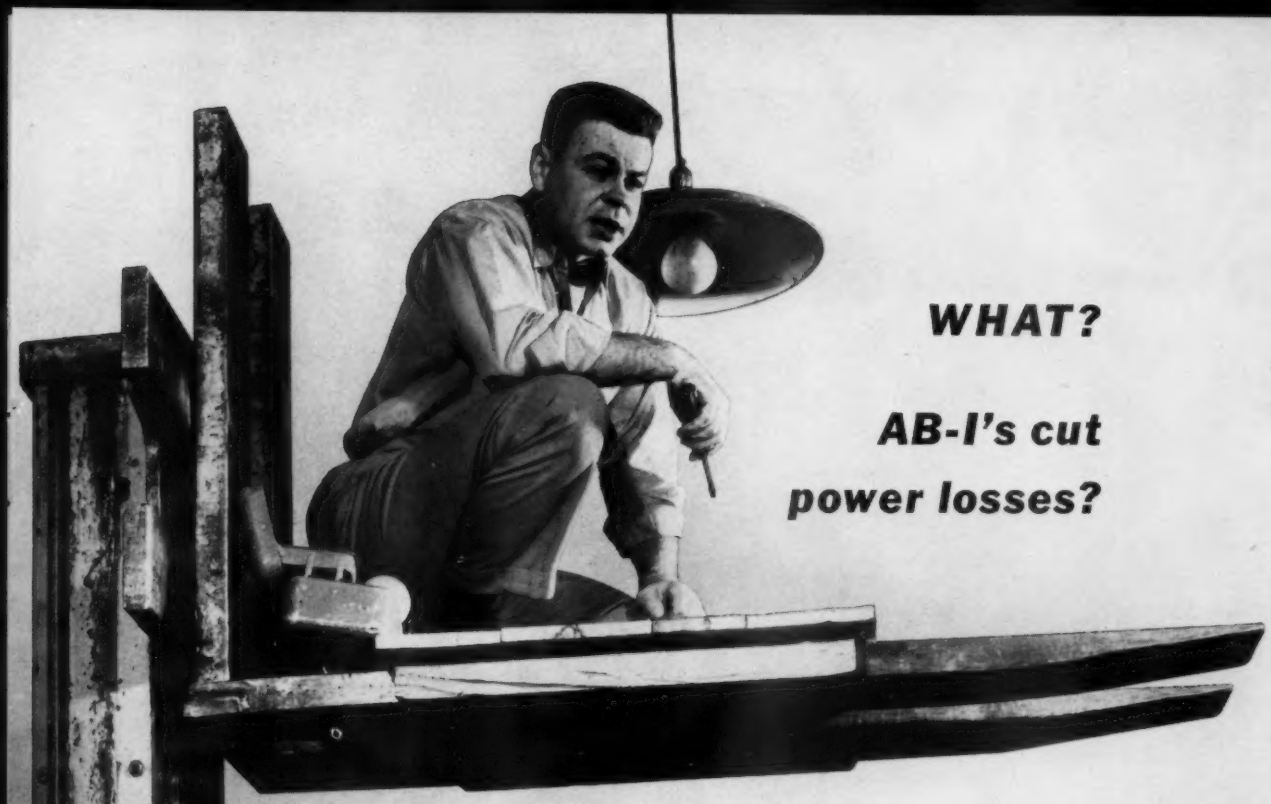
For installation on concrete docks, Perma-Docks are announced as automatically self-adjusting to truck or trailer floor levels. They are designed for minimum set-back to allow more usable dock

space, and swing up and out of the way when not in use. Made of magnesium for lightness and ease of handling, they can be quickly raised or lowered, company says. Optional equipment includes electric-hydraulic system for fully automatic operation. Additional features include safety curbs for power truck tire protection; crowned design to prevent hang up of low underclearance equipment; flared curb ends for safe wide angle turns; beveled edges to avoid load jar. Perma-Docks can be installed at cost savings of approximately 60 per cent, company states. Magline Inc.

23—COATING for vacuum metallizing of metals

M-241 is announced as having superior physical properties as compared to lacquer and enamel type coatings this company has been manufacturing. Vacuum metallizing on metal is the deposition of an alloy, usually aluminum, by evaporation in a vacuum chamber, it is explained. To protect this thin film and give de-

For more facts circle 595 on Reply Card——→



WHAT?

AB-I's cut power losses?

CONSIDERABLY. Current flows so freely through the low impedance in circuit breakers that power loss is usually no more than that in the line. Electrically welded connections, low-current-density loading of parts and silver-alloy contacts keep watt loss to a minimum. Compared to other protective devices, this adds up to substantial dollar savings.

AB-I's also pay off by saving the cost of unnecessary down time. It takes but a flip of the handle to restore power after a circuit has been cut out due to a fault or overload. There's no lost time checking, finding and installing replacement parts.

There are at least four ways you save hard cash when you use AB-I's . . .

1. In cost of original equipment
2. In cost of replacement
3. In less power consumed
4. In less production time wasted.

AND, you provide the most positive protection for your equipment.

Get the complete story from your Westinghouse distributor. Ask him for Descriptive Bulletin 30-250 or write: Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-30270

YOU CAN BE SURE...IF IT'S

Westinghouse

Schramm Compressors provide air for chipping, cleaning, grinding, drilling, operating hoists and lifts, sand rammers, vibrators and molding machines.

ONE AIR COMPRESSOR USER REPORTS:

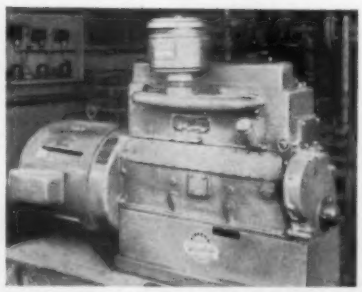
"Eight years of satisfactory service and not a cent for repairs"

In modern foundry and steel mill practice, where compressed air is indispensable, Schramm Industrial Compressors are establishing new records for continuous, trouble-free performance.

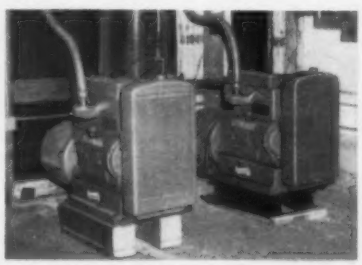
Schramm Compressors set performance records because they incorporate many design features found in no other machine. Balanced reciprocating parts give vibrationless operation, permit out-of-the-way installation without special foundations. Schramm engineered cooling systems—air blast for units delivering 50 cfm of free air, or less; liquid cooling for larger sizes—provide adequate cooling for full load, permitting continuous operation.

The economic advantages of buying Schramm Industrial Compressors are outstanding. Initial cost, compared with other compressors delivering the same amount of free air, is low. Maintenance of Schramm Compressors is no problem—any mechanic who understands gasoline engines understands Schramm Compressors.

Write today for free literature.



JACKETED LIQUID COOLING SYSTEM. Units delivering 85 cfm and over are jacketed for liquid cooling. Furnished with inlet and outlet flanges or Schramm cooling unit.



NO FOUNDATIONS. Schramm balanced design permits installation without expensive foundations. Units can be set up in almost any out-of-the-way location.

Schramm, Inc.

MANUFACTURERS OF AIR COMPRESSORS

665 North Garfield Ave. • West Chester, Pa.

For more facts circle 596 on Reply Card

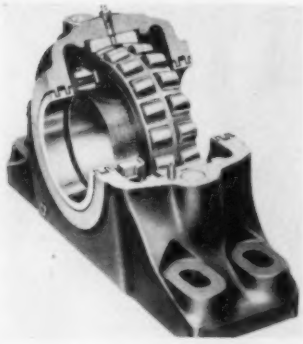
NEW PRODUCTS

(Begins on page 168)

sired physical properties, a top coating is usually applied and this results in a bright appearance similar to electroplating. M-241, a sprayed and baked material, is claimed to impart a mirror like brilliance. Its hardness is given as between 7H and 9H pencil hardness, and its abrasion resistance as 48 per cent better than most lacquer type coatings used in vacuum metallizing. Manufacturer adds that upon exposure to ultra violet light, the coating shows no tendency to yellow or darken. Logo, Inc.

24—PILLOW BLOCKS have unique mounting feature

Spher-Align Pillow Blocks incorporate a mounting feature, called Micro-Mount, which makes it possible to seat the bearings solidly on shafts quickly and easily, it is announced. This is accomplished in the new line of spherical roller bearing pillow blocks through use of set screws located parallel to the bore in the adapter nut. After bearing is snugged up with



the adapter nut, adjustment is completed by turning the screws against the locking washer until bearing, adapter and shaft form an integral unit.

Spher-Align Pillow Blocks are suggested for applications in which self-alignment and ease of installation and maintenance are desirable. The compact housing is made of close-grained semi-steel to withstand shock loads. The units are designed to allow lubricant to enter at the center of bearing and move outwardly along bearing surfaces. Convenient drain plugs permit use of either grease or oil and provide for easy flushing. Triple seals retain the lubricant. Dimensions of Spher-Align Pillow Blocks are standardized to make them interchangeable with similar units. They come in both expansion and non-expansion types in sizes to fit shafts from $2\frac{7}{16}$ to 8 in. diam. Dodge Mfg. Corp.

25—SAFETY SPECS for those who visit plant

These lightweight safety spectacles may be used for semi-hazardous operations as well as for protection of visitors to in-

For more facts circle 597 on Reply Card—→

Fire-retardant, shatterproof panels, made with HETRON resins, let the daylight into this plant of Davis Fire Brick Company, Jackson, Ohio.

Free Light

How to let nature subsidize your lighting with fire-retardant panels

To be sure of safe, fire-retardant panels, look for both these labels when you buy. Only HETRON-based panels (sold under fabricators' brand names) carry these labels, because only HETRON resins have inherent fire retardance.

Soft, cool light—light you can use—floods through these fire-retardant polyester panels.

Free light that can cover much of the work area you now illuminate electrically. Light that doesn't glare or fatigue and therefore improves efficiency. Light that reduces shadows, making your plant safer to work in.

You get an extra measure of safety when you use HETRON®-based panels for skylighting and windows. HETRON polyester resins have *inherent* fire retardance.

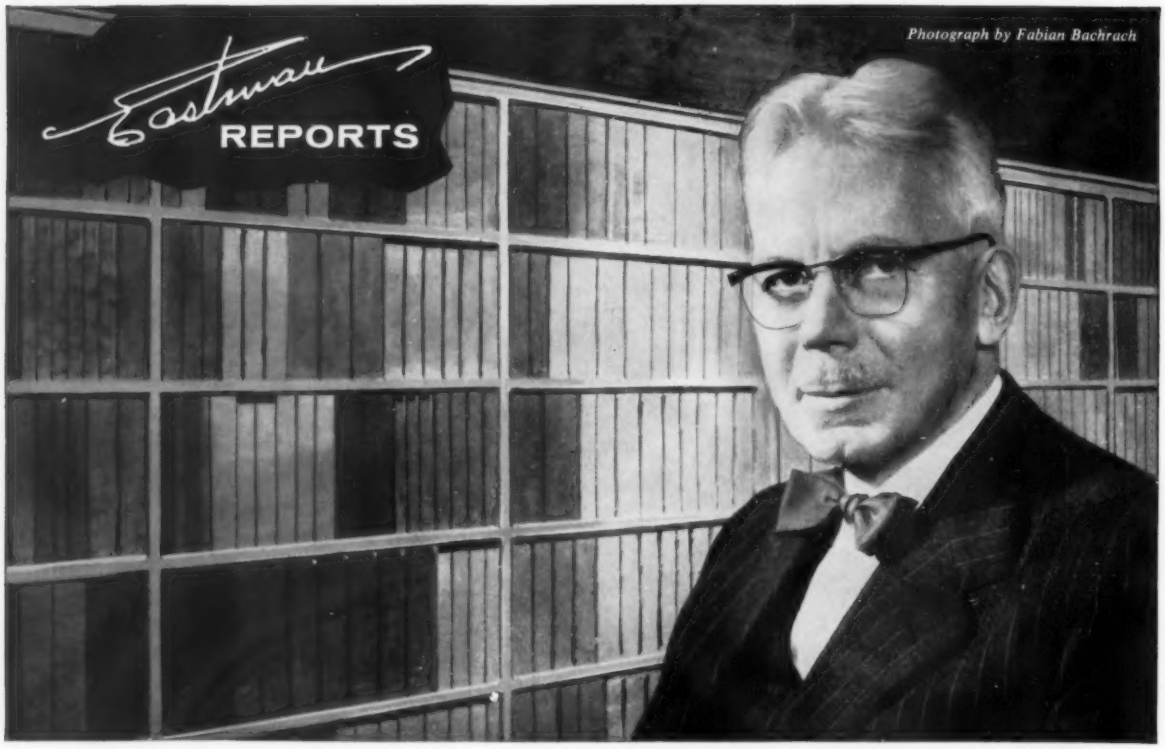
That's why HETRON-based panels have both UNDERWRITERS' listings and FACTORY MUTUAL approval. *Only* HETRON-based panels have these assurances of safe building materials.

For a list of the many reputable fabricators selling HETRON-based panels, write us today.

DUREZ® DUREZ PLASTICS DIVISION

HOOKER ELECTROCHEMICAL COMPANY
2904 Walck Road, North Tonawanda, N. Y.

HOOKER CHEMICALS PLASTICS



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"70% of Advertisement Reading in Business Publications is intentional—not accidental"

says **ROY EASTMAN** of the Eastman Research Organization

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"The overall results of a year's inquiry on this subject (32 surveys for 18 publications) show that the average exposure to advertising is *70% intentional,* only 30% accidental.

"Moreover, 94% of the readers of these publications, on the average, reported that they gave conscious attention to the advertising."

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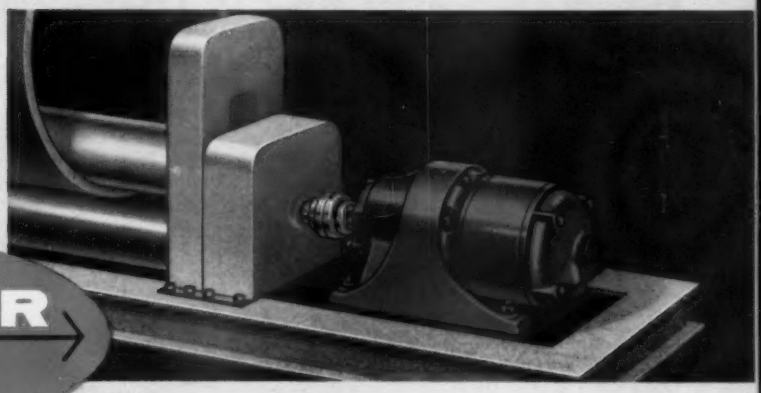
The national association of publishers of 173 technical, professional, scientific, industrial, merchandising and marketing magazines, having a combined circulation of 4,098,937 . . . audited by either the Audit Bureau of Circulations or Business Publications Audit of Circulation, Inc. . . . serving and promoting the Business Press of America . . . bringing thousands of pages of specialized know-how and advertising to the men who make decisions in the businesses, industries, sciences and professions . . . pin-pointing the market of your choice.

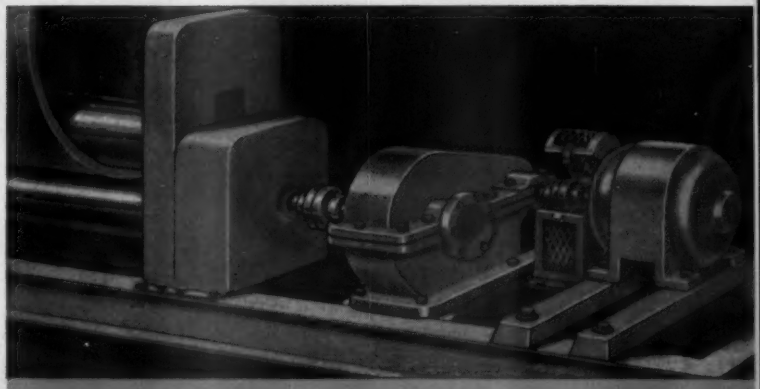
Write for a list of the NPB publications and the "Here's How" booklet, "How Well Will We Have to Sell Tomorrow?", written by Ralston B. Reid, Advertising & Sales Promotion Manager of the Apparatus Sales Division, General Electric Company.

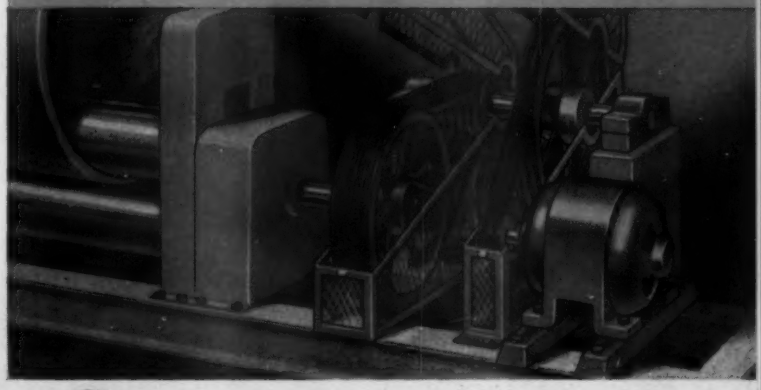
USE THE *Simplest* METHOD TO APPLY LOW SPEED POWER



SYNCROGEAR
THE INTERNALLY GEARED MOTOR

Reject CUMBERSOME HOOKUPS





The U. S. Syncrogear is more than a motor. Its "packaged" assembly includes a high speed motor, an enclosed sealed gear-train, correctly engineered for the load, always in exact alignment, all mounted in a single case which saves space and eliminates the ungainly appearance of complicated hookups. You don't have to calculate chain, sprocket, bearing or shaft requirements, or invest in separate mechanisms, special fabricated guards, extra pulleys and belting when you direct-connect a Syncrogear. More and more manufacturers are using Syncrogears on their products to improve appearance and increase saleability.

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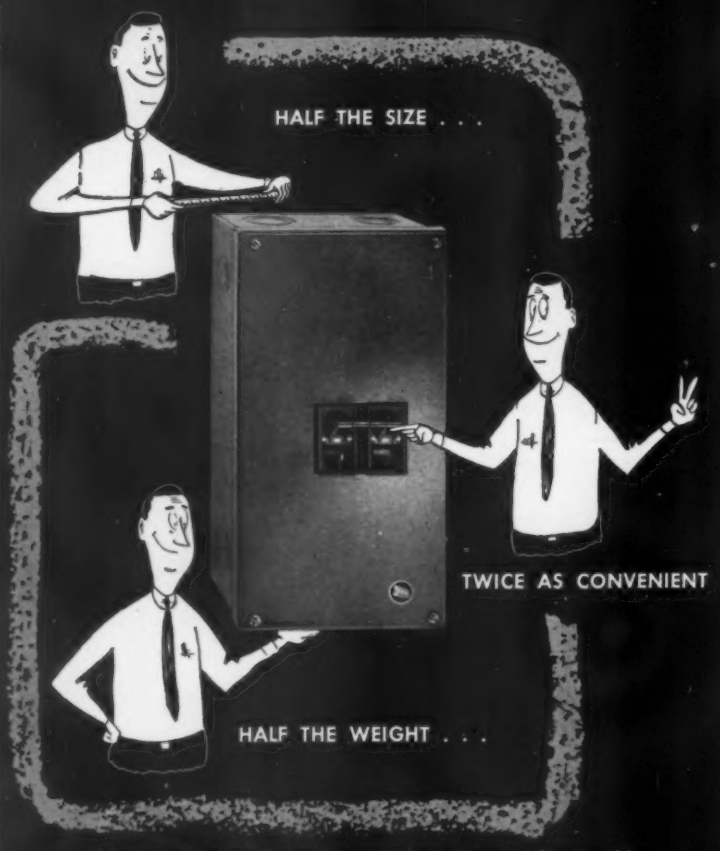
the best circuit breaker safety switch costs no more

You would expect to pay *much* more for this Heinemann 100 Ampere Safety Switch.



It's easier to install, more convenient to use. After trouble is cleared from the line, a flip of the handle restores service instantly. There's no hunting for fuses . . . no waiting to reset. Heinemann circuit breakers operate hydraulic-magnetically . . . permit safe use of the full capacity of your wiring at any temperature, without de-rating or the extra cost of larger switches. Inverse time delay allows necessary starting currents, prevents false-alarm tripping.

It's less than half the size and half the weight of comparably rated fused switches.

Yet, with all this extra value, the Heinemann Safety Switch costs no more. For descriptive literature, request Bulletin 1411.

ORDER NOW

For 120/240 volts AC, 3 wire; 120 volts AC 2 wire with insulated groundable neutral.

Cat. No. H-9002-70 enclosure with 70 amp. circuit breakers.
Cat. No. H-9002-100 enclosure with 100 amp. circuit breakers.

HEINEMANN ELECTRIC COMPANY Circuit Breaker

128 Plum Street, Trenton 2, N. J.

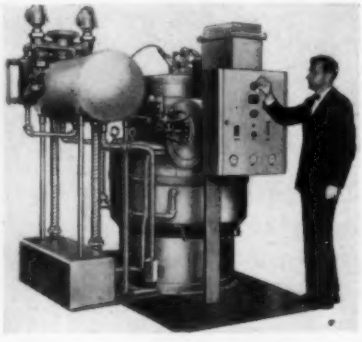
NEW PRODUCTS

(Begins on page 168)

plant locations, it is announced. The lenses, either clear or dark green, are impact-resistant plastic and the attractively-styled frames have spatula temples. Manufacturer says the standard size fits any face with minimum adjustment, and can be worn over prescription glasses. Each pair comes in a paper fleece-lined slide case and they cost around 55 cents each when purchased in dozen lots. General Scientific Equipment Co.

26—WATER TUBE BOILER is compact, fast steaming

The 150-hp Vapor Modulatic Water Tube Boiler is a drum type unit about one-third the size of many boilers of the same capacity. It is designed to produce low pressure steam, 5 to 15 lb pressure, for heating. According to manufacturer, it develops steam in 5 min from a cold start. Hot gases from a forced draft fire,



burning oil or city gas fuel, wipe over and around the four sets of steel coils heating the water as it is pumped through the coils. Two turbine type water pumps, driven by one electric motor, re-circulate water from the steam drum through the coils. Steam rises off the water in the drum and passes through a separator inside the drum, to remove excessive moisture, before the steam is fed into the plant's heating system.

This new package boiler is 96 in. high and long, is 80 in. wide, and mounted on a steel base plate. It comes fully assembled with automatic controls, ready for service connections. (Other models of the drum type Vapor Modulatic Boilers are designed to produce steam up to 125 lb pressure; units capable of producing to 5000 lb of low pressure heating steam and 125 lb working steam pressure are planned.) Safety controls include steam temperature limit control, two safety valves, outfire control and low water shutoff. Vapor Heating Corp.

27—PLASTIC LINER is easily applied, long lived

Coroline 347 is an epoxy base compound offered for use where non-corrosive liners are required. The new plastic is claimed inert to organic acids,

MAKE KOPPERS YOUR HEADQUARTERS FOR INFORMATION ON CORROSION PREVENTION

The Corrosion Report at the right is the first in a continuing series. Through these Reports, we hope to give you useful, practical information which will be of value in your corrosion-prevention work.

These Reports reflect the many years of experience by Koppers Tar Products Division in the manufacture and successful application of protective coating materials. Though not the answer to all corrosion problems, protective coatings are a useful ally in industry's fight against corrosion.

If you have a problem on any phase of corrosion prevention, it is likely that we have literature which will help you. Use the coupon below for your request.

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Tar Products Division
Dept. 115D
Pittsburgh 19, Pa.

☐ I have a specific corrosion problem in:

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how to CUT CORROSION LOSSES

a report by Koppers Company, Inc.

W. E. Kemp,
Manager of the Technical Dept.

Although corrosion losses are never listed on a profit and loss statement, they represent a considerable—and often unnecessary—loss to every industry. Preventing this loss is a big part of our business as the world's leading producer of coal tar base enamels and coatings.

* * *

Many times every week we get a phone call, wire or letter asking the same, often harried, question: "Can you help me with this corrosion problem . . . ?" In most cases, we *can* help, and are most happy to do so. In fact, our Coal Tar Technical Department is designed to facilitate such help.

Basically, we have two groups within the Technical Department—the Development Group and the Technical Service Group. They are both headquartered at Verona, Pa., in a new building with the latest facilities for laboratory work and pilot plant operations. This building also houses the Quality Control staff of the Tar Products Division. These ten chemists cross-check the quality control operations of each plant.

Our Development Group consists of a General Supervisor, Mr. Frank Charlton, and two project leaders who supervise the activities of nine chemists and engineers. They work constantly to up-grade the effectiveness of Bitumastic coatings and to develop new coal tar coatings.

Our Technical Service Group, supervised by Mr. C. U. Pittman, also includes two project leaders and four laboratory workers. These men work in close liaison with our customers, distributors and sales engineers to help them specify the best coating and the most economical application for the job.

We also retain the services of two widely-known coating and corrosion scientists: Dr. W. F. Fair, Jr. and Mr. R. C. Stromquist. Both of these men—and each member of the Technical Department supervisory staff—have had more than 20 years' experience in the bituminous coating field. Dr. Fair and Mr. Stromquist work with all departments and, through first-hand field experience in their extensive travel, alert us to customer needs for new or modified protective coatings.

* * *

Naturally, many of our technical personnel participate quite actively in industrial and technical organizations. One of our coatings consultants, Dr. W. F. Fair, Jr., actually served full time last year as president of the National Association of Corrosion Engineers. Altogether, 70% of our men are members of scientific and technical societies. They participate actively on committees working on industry-wide problems.

In future columns, we plan to report to you on specific corrosion problems in such industries as steel, gas, petroleum, water supply and sewage and industrial wastes. In the meantime, we'd like to hear about your problems. Write to Koppers Company, Inc., 1301 Koppers Building, Dept. 115D, Pittsburgh, Pa. In Canada, Koppers Products, Ltd., Toronto and Edmonton.

KOPPERS

BITUMASTIC
REG. U. S. PAT. OFF.
COATINGS AND ENAMELS

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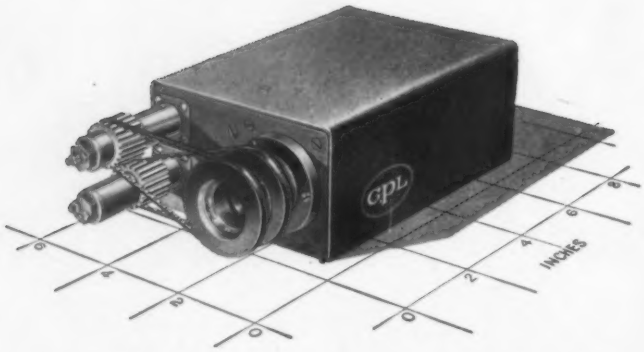


tiny camera sees some shocking sights

THE CLOSED-CIRCUIT TV CAMERA shown above is the world's toughest. Its name: the RUGGEDIZED. The maker: GPL.

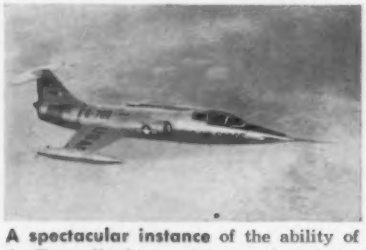
The extraordinary feature of the Ruggedized is its unique ability to withstand shock, noise and vibration. Because of this ability, businessmen and engineers are now able to get clear picture reports on many industrial operations never before seen.

In many instances, the barrier to sight has been vibration too intense or noise too loud for any human (or TV camera) to get close to. Rocket and jet test-stand operations —where the Ruggedized is now being used extensively—are examples.

In other cases, inaccessibility has been a complicating factor. To overcome this difficulty, the Ruggedized was made tiny as well as tough.

GPL's Ruggedized camera can withstand temperatures of minus 55°C to plus 60°C, humidity levels of 100%, and is spray-proof. Forces exceeding 15 G's in each of its three axes, noise levels as high as 200 decibels and altitudes over 70,000 feet do not affect its picture detail.

If you'd like to look into your own industrial operations – including those industrial operations you never thought see-able—get in touch with us for full information. If you wish, we will be glad to arrange for a demonstration of the Ruggedized, or any other GPL closed-circuit TV equipment, in your own office or plant by local GPL representative. Write, on your letterhead, to: Mr. N. M. Marshall, General Precision Laboratory Incorporated, 62 Bedford Road, Pleasantville, N. Y.



A spectacular instance of the ability of the Ruggedized to get into – and send pictures *out* of—tight places is its performance *inside* the plenum chamber of an F-104.

Even bone-shattering concussions can't disturb perfect pictures of GPL's Ruggedized camera, designed specifically for the most severe applications.

GPL

SUBSIDIARY OF GPE

General Precision Laboratory Incorporated

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 168)

dilute mineral acids, caustics, alkaline materials and most solvents. Lining applications reported include tanks, scrubbers, steamers, columns and ducts and it is said to be particularly successful for use with petroleum products. Coroline 347 is composed of two parts mixed at time of application. It can be brushed or sprayed on and may be used in applying glass cloth or other fabrics. According to manufacturer, this plastic hardens at ambient temperatures in about 24 hr and applications can be checked by high voltage spark testing. Coroline 347 is claimed to be long lived and have good adhesion qualities, and when more than one coat is required, successive applications may be made immediately, company states. The Homalite Corp.

28—PLATE GLASS for curtain wall construction

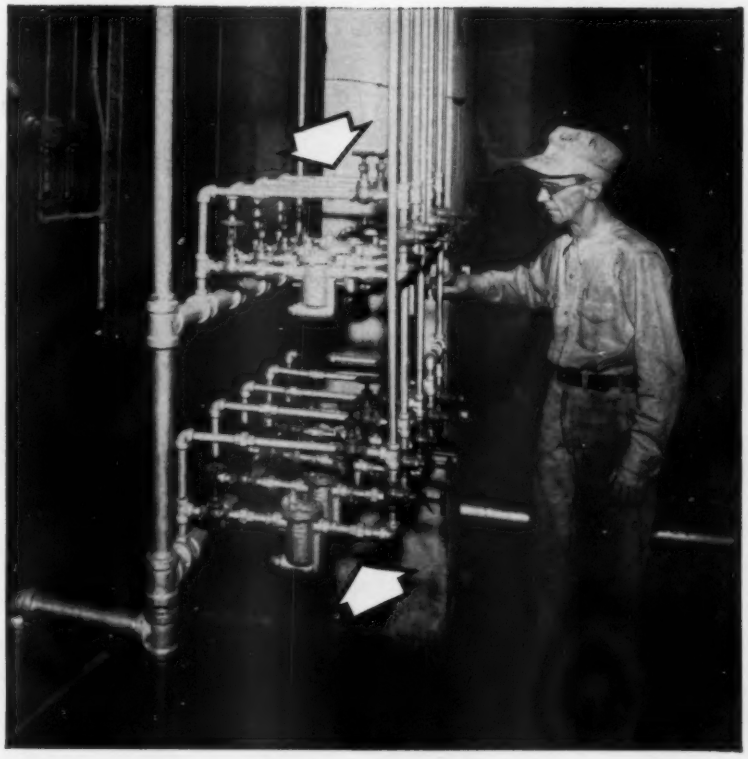
Beauty of surface and texture, enhanced with color, is a trend in buildings using ribbon glass windows in curtain wall construction. To add to the color and mirror effects possible in modern glass wall structures, this manufacturer introduces Vitrolux, a spandrel plate glass. It will have ceramic colors fused onto the inner side of the plates in a selection of 16 colors and black and white. During production, this glass will be heat-strengthened to give it additional strength to resist shock. The spandrel units will be made of ¼ in. plate glass with maximum sizes of 60 by 48 in. Libbey-Owens-Ford Glass Co.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 247-248.

29—MANIFOLD affords economical valve mounting

This manifold is designed to afford economical and efficient multiple mounting of company's Speed King two-, three- or four-way valves in any desired combination. Available in two- and three-station types, the cast aluminum manifold has full length inlet and exhaust ports, both 1 in. NPT, common to all valve stations. Electrical wiring is run through a 1¼ in. NPT conduit passage, with one access cover for all stations to simplify wiring. Pilot solenoid leads are enclosed in flexible conduit. Manifolds are designed with side or bottom cylinder porting to facilitate piping. Holes for mounting manifold and valve assembly are also provided. According to manufacturer, manifold can be adapted

Good Trapping Practice with Good Traps Roy Davis, Maintenance Superintendent, looks over one of the well-engineered Armstrong trap installations he has made at the Masonic Temple in Detroit. Traps discharge to 15" vacuum.



Keeping the Coffee Perkin' with Armstrong traps draining steam heated coffee urns.

Detroit's Masonic Temple Solves Vacuum Loss by Installing Armstrong Inverted Bucket Steam Traps

MANY AN engineering hour has been spent ferreting out the leaks in a vacuum return system. Here's a tip if you have the problem: *check your steam traps.* Don't worry about *flash* steam from traps—look for the traps that are leaking *live* steam. Take the case of the big Masonic Temple in Detroit:

The 11,600,000 cubic foot building has banquet space for 4500 persons at a sitting. Imagine the bedlam in the kitchen when the steam heated cooking equipment couldn't meet dinner schedules!—simply because condensate drainage was sluggish. The cooks were always in a stew and calls to the maintenance department were daily occurences.

The building buys 35 lb steam from Detroit Edison. Line pressure is used for the cooking kettles, while regulating stations supply 2 to 3 lb steam for the heating system.

Couldn't Hold Vacuum

Prior to the installation of Armstrong traps, maximum vacuum attainable was 4 inches and in some cases it was necessary to manually drain the systems and dump the condensate.

According to Roy Davis, Maintenance Superintendent, the installation throughout of Armstrong inverted bucket steam traps has solved the problem. "*I don't remember having had the chefs complain since . . . the kettles heat in a hurry now.*"

F. W. Emblin, Operations Manager, adds, "*You can check the vacuum gage any time now and seldom find less than 15" showing.*"

There's another nice part to this story that only time will reveal: Armstrong traps have a habit of delivering this kind of service on low pressure vacuum return systems for years and years without repairs. Your local Armstrong Representative has plenty of cases he can tell you about. Why not call him today?

ARMSTRONG MACHINE WORKS
9124 Maple Street • Three Rivers, Michigan

FACT-FULL LITERATURE FOR YOU

FREE: 44-Page Steam Trap Book plus two reprints explaining facts about trap operation on vacuum return service.

ARMSTRONG MACHINE WORKS
9124 Maple Street, Three Rivers, Michigan
Please send Steam Trap Book, "Flash at Traps" and "Vacuum Isn't Vacuum."

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Company_____
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For more facts circle 603 on Reply Card

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For plants, offices, schools, stores, laboratories, restaurants

- Totally enclosed single phase permanent split capacitor motor.
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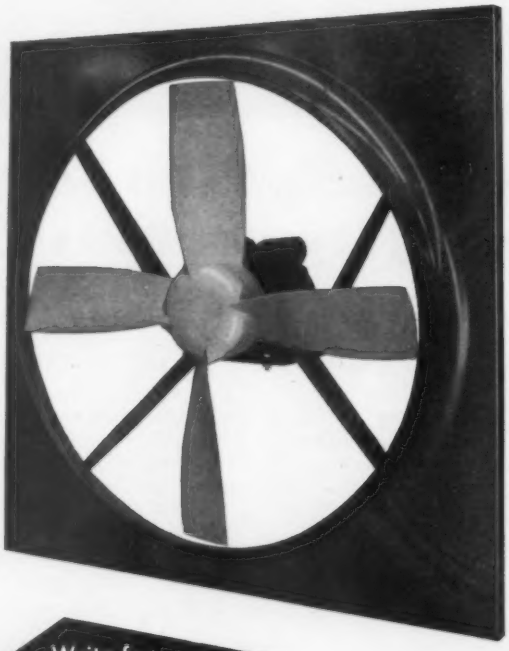
- Certified air deliveries from 2900 to 10800 CFM.
- Backed by two of the oldest and best known names in ventilating fans.
- Direct drive eliminates horsepower loss from belt friction.



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Manufacturers of a complete line of fans for industrial, commercial and residential service.

ATTIC FANS

AIRSPREAD FANS

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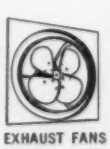
KITCHEN RANGE HOOD


EXHAUST FANS

For more facts circle 604 on Reply Card

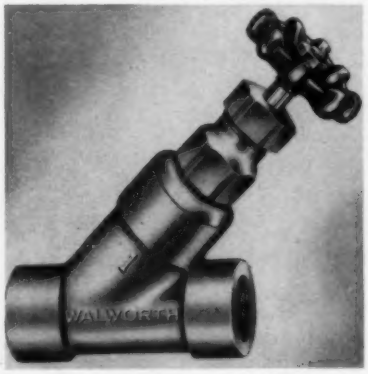
NEW PRODUCTS

(Begins on page 168)

to any type of control valve application. Combinations of single or double solenoid valves can be mounted at any station on manifold. Remote operated, speed controlled and oil pilot Speed King Valves also are suitable for use. Valvair Corp.

30—PLASTIC VALVE weighs little, resists corrosion

Announced as the first all-plastic Y-globe valve with full flow passage, this rigid polyvinyl chloride valve is designed to provide tight shutoff and flow control of alkalis, acids, inorganic salt solutions and other corrosive fluids used in food, oil, gas, petro-chemical,



chemical, paper industries. This valve is claimed non-toxic as well as non-corroding. Its bonnet and gland nut design provides a leak-proof unit, company points out. Because of its sturdy construction, the valve is said to operate successfully at pressures to 150 psi at 75 F. Life of the valve's packing is prolonged through a tapered back seat on stem designed to permit repacking under pressure. The valve is about 1/6 the weight of an equivalent brass or steel valve. It will be available with threaded and solvent-weld socket-type ends for 1-in. pipe. Other sizes are expected to be available. Walworth Co.

31—GAGE checks pitch diameter of threaded parts

Announced as capable of indicating pitch diameters of any threaded part having external screw threads up to 1½ in. diam and of any specified pitch, this instrument needs no special wires or attachments. It can be operated mechanically to obtain pitch diameter readings from 0 in. upward on a large dial graduated in 0.0001 in. (To achieve more precise measurement, the checker may be adapted for use with suitable air gages and air gaging cartridges or electronic amplifier and pick-up unit.)

The new device uses a pair of gaging tips for each pitch of thread to be checked. These tips have threaded shanks and are interchangeable to check virtually any pitch of any straight

Change motors in minutes—

with FALK *all-steel* MOTOREDUCERS

No long and costly "down time" involved

Motors can be interchanged or replaced *in minutes* with the all-steel, All-Motor type FALK Motoreducer. No long and costly "down time" is involved in making the change!

Best of all, replacement is not limited to original make of motor—new NEMA frames may be substituted for old. This versatile Motoreducer operates with any make, speed or type of standard foot-mounted motor within its AGMA rating. No modification, no special shaft, no "partial" motor required.

In addition to unmatched motor interchangeability, this dependable gear drive—the "work horse of industry"—offers: widest choice of output-shaft position (horizontal, vertical, right-angle)...any output-shaft connection...any mounting, including wall and ceiling...standard speed range from 1.5 rpm to 1430 rpm. All these advantages, plus proved efficiency, low maintenance and extra-long life, make the All-Motor type FALK Motoreducer your best buy for any job requirement.

Furnished in sizes up to 75 hp with any make, style or type of motor; or, *without a motor if desired.* FALK Motoreducers are available from convenient factory, field or distributor stocks, from coast to coast.

Write for Bulletin 3100

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MANUFACTURERS OF:

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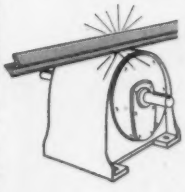
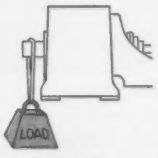
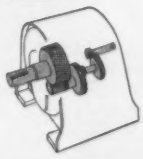


ALL-STEEL HOUSINGS
Rugged, strong, rigid ...all parts heavy steel plate, formed and welded in the Falk Weld Shop.



LARGE OVERHUNG LOAD CAPACITY
Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum loads.



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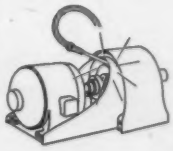
Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion.



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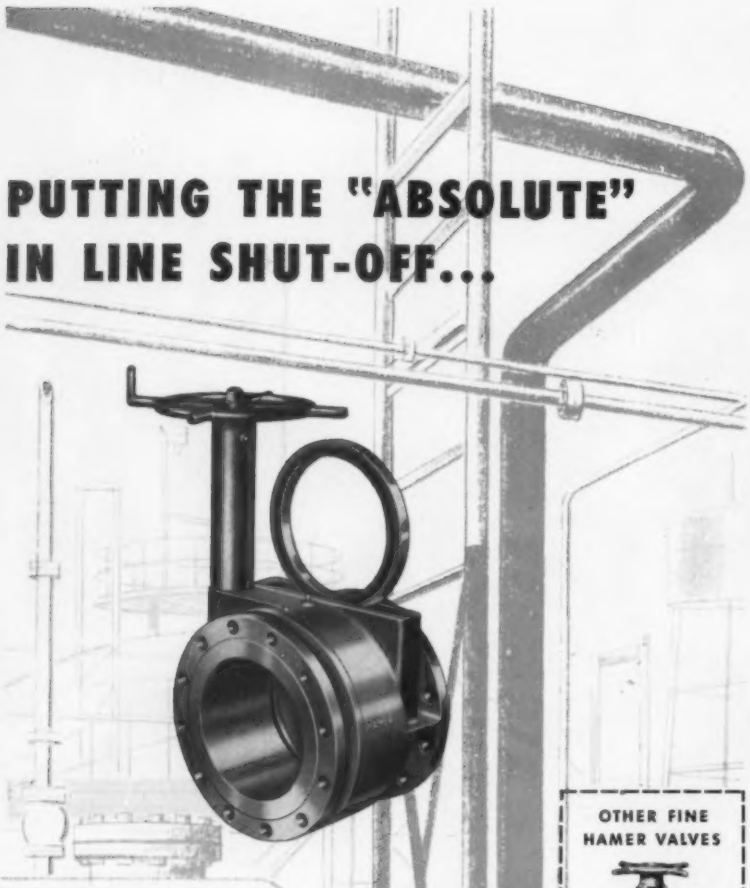
Splashproof, dustproof, oiltight. Dual closures and one-way vents keep oil in, dust and moisture out.

PUTTING THE "ABSOLUTE" IN LINE SHUT-OFF...



Hamer Line Blind Valves

It has long been recognized that conventional type valves do develop leaks. And contamination of product when it occurs costs dearly in time and money. Preventing this is where Hamer Line Blinds excel. Handwheel or bar operated, Hamer Line Blind Valves squeeze dead tight against the center spectacle plate forming an impassable line shut-off that's both permanent and absolute. Yet Hamer Line Blinds are fast, safe, simple to operate. One man can open or blind a line in one minute. Investigate Hamer Line Blinds. Let a Hamer representative show you how these remarkable valves can actually pay for themselves.

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OTHER FINE HAMER VALVES

Leak-proof Gate Valve

Visible Wedge Valve

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Hamer VALVES INC.

P. O. Box 1851
2919 Gardenia Ave., Long Beach 1, Calif.
Representatives throughout the World

For more facts circle 606 on Reply Card

NEW PRODUCTS

(Begins on page 168)

screw thread. A knob on the gaging head lets operator select 16-oz or 40-oz gaging pressure—other gaging pressures are available. Parts are rolled slowly into position between gaging tips and pressure differentials are read plus or minus from zero on the indicator dial. Setup is made from a master thread plug or previously calibrated part. The Sheffield Corp.

32—FAUCET for solvent drum storage dispensing

An improved corrosion-resistant faucet, Model U-008, is introduced for dispensing corrosive and inflammable fluids in the chemical, food, pharmaceutical and other industries. Fabricated of 304 stainless steel, the unit

is reported approved by Factory Mutual Laboratories. Metal-to-metal contact is eliminated in the operation of this valve by use of Kel-F fluorocarbon seal rings. Tests are reported to show that its anti-flash screen prevents propagation of any flames entering the storage drum through the spout in the handling of inflammable solvents.

This self-closing faucet can be disassembled for cleaning and can be chemically and/or steam sterilized, it is noted. There are only three moving parts. The shank is supplied in interchangeable sizes of ⅛, ¾ and ½ in. with tapered threads to allow a snug fit in bung threads of dispensing drum. Economy Faucet Co.

33—AIR CONDITIONERS are multi-zone units

Recent additions to this company's Flow-Temp line are multi-zone air conditioners in eight sizes, offering capacities from 1370 to 21,000 cfm of air. They are intended for buildings in which heating and cooling are required simultaneously, and are constructed so that they can service any one of many zones in a building. They are designed to deliver either filtered, cooled and dehumidified air, or filtered, heated and humidified air, or a mixture of both in any proportion.

All sizes have a standard number of

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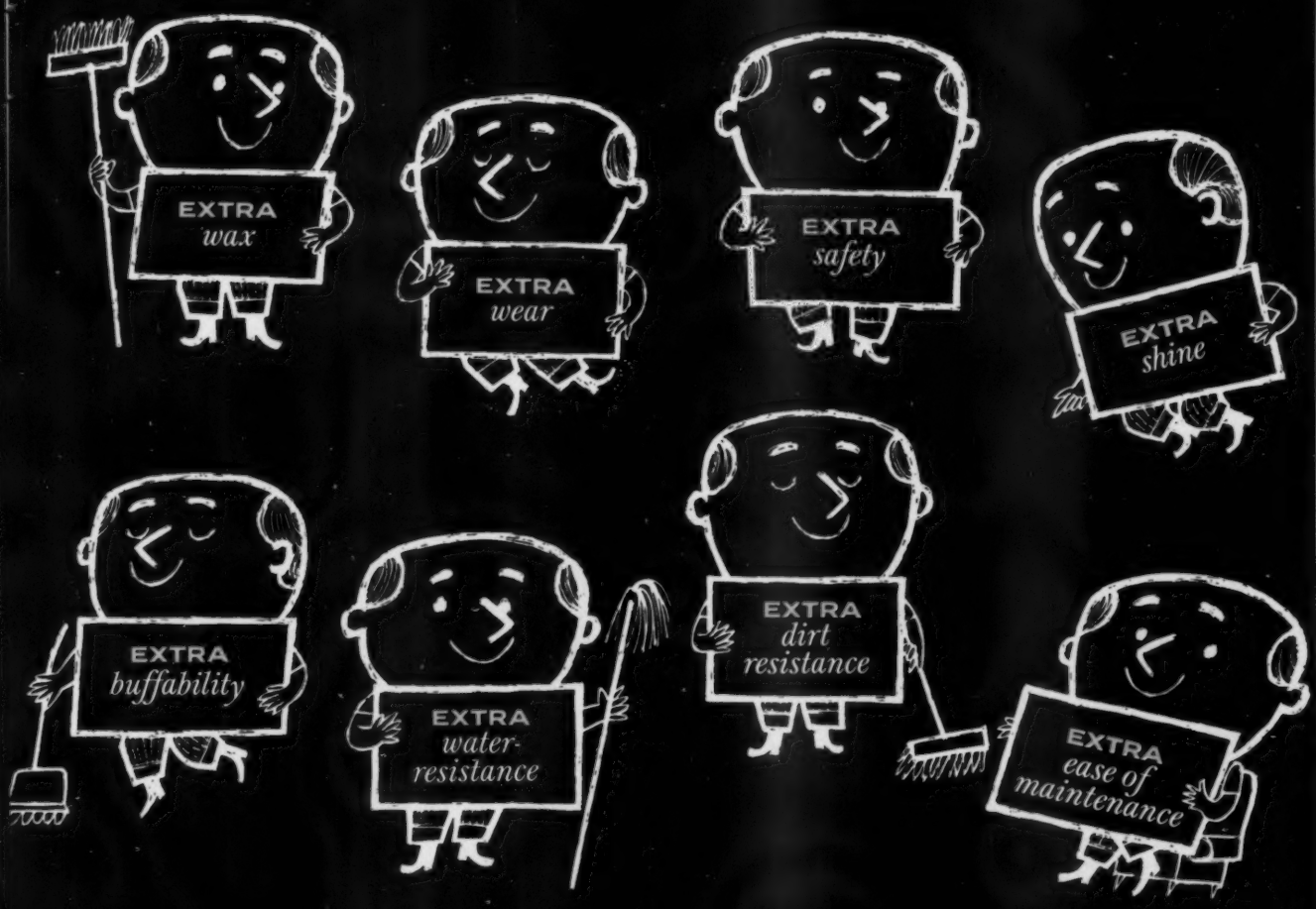
WAXTRA

the Wax with all the Extras



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Waxtra guarantees better looking floors with less work and less cost. Keeps appearance up and upkeep costs down. For a convincing demonstration of all the extra qualities of Waxtra . . . or to place your order . . . phone your local Johnson's Wax distributor today.

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When you put his knowledge of lighting to work for you — in the planning stage or on the job — you get the benefit of his experience in turning lighting purchases into profitable and productive lighting investments. You can have confidence in his judgement because he knows how to fit the Smithcraft line of lighting units into your budget as well as your blueprints. Call him in to consult with you or your plant engineer at any time.

*Arthur W. Siegel, Massachusetts Representative, one of Smithcraft's nationwide sales organization

Because the ALS is so much more efficient and so much less costly to maintain, fewer units are required to produce the same lighting levels. With these lowered costs there's a substantial bonus in favorable production factors . . . improved quality, fewer rejects, less fatigue, improved safety conditions and less employee turnover and absenteeism.

Smithcraft A.L.S. and other fine lighting units are installed in thousands of factories, offices, schools, stores, and other types of installations from coast to coast. Wherever good lighting is important, you'll find . . .

SMITHCRAFT—"AMERICA'S FINEST FLUORESCENT LIGHTING."

Smithcraft LIGHTING, CHELSEA 50, MASS.

PLEASE ATTACH TO YOUR BUSINESS LETTERHEAD and mail to

Smithcraft LIGHTING, CHELSEA 50, MASS. PE-4

NAME_____TITLE_____

☐ Please send me the monthly publication, "Light Side of the News", so that I can keep in touch with the latest trends in lighting.

☐ Please send me the "A.L.S. FOLDER".

☐ Please send me the complete SMITHCRAFT CATALOG, containing data on "America's Finest Fluorescent Equipment".

For more facts circle 608 on Reply Card

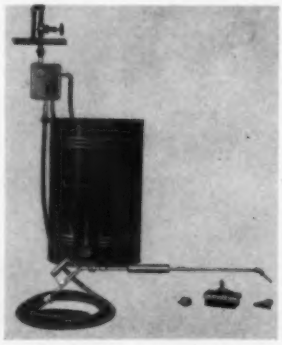
NEW PRODUCTS

(Begins on page 168)

zones available—from six on the smallest to 22 on the largest. Each available zone consists of one hot air damper and one cold air damper, both mounted on a common shaft, so that when one is closed the other is open. Each zone is divided from adjoining ones by a divider plate. All zones are interconnected by a single, external connecting rod which can be adjusted to job requirements. Accessories are available for both vertical and horizontal units. Catalog 383 gives engineering data. Acme Industries, Inc.

34—CLEANING UNIT uses the existing steam supplies

The Steamerette is announced as an injector unit that uses existing steam supplies for steam cleaning, paint stripping, phosphating or sanitizing. The product



is said to provide complete steam cleaning facilities for a fraction of the usual cost and to be easily operated. It will operate anywhere in the range of 40-140 psi steam, it is noted, and has a powerful impinging force at pressures within this range. A built-in pressure gage indicates operating pressure, and serves to eliminate fluctuating and assure uniform cleaning. Quantity and pressure of solution may be varied. Turco Products, Inc.

35—LEVEL RECORDER works at all operating pressures

Automatic compensation of drum level measurements over the entire boiler operating range is declared available in this compensating level recorder. A bourdon helix compensator continuously readjusts the pen to record true drum level. Operating from drum pressure, the compensator is designed to offset the effect of any change in specific weight of the water. Thus, it is explained, that at saturation conditions, complete compensation is achieved over entire ranges of level, pressure, and temperature.

This recorder is used on boilers with rate pressure above 900 psig, and reheat boilers which must perform many hours below operating pressures during start-up. High and low alarm contacts and/or pneumatic retransmitters may be added. Range of level measurement is from 0-12

ECON'S exclusive STOP-WATCH ACTION MAKES THE BIG DIFFERENCE

When current overload is continued beyond the safe and pre-determined time, exclusive Econ-Alloy breaks the circuit by changing directly from solid to liquid. The usual plastic stage is eliminated, insuring faster, more accurate protection against overloads and shorts . . .
ECON-ALLOY makes the DIFFERENCE
• Stops needless fuse blows safely
• Complete protection against shorts and dangerous overloads
• Cuts fuse costs and downtime

You protect against needless fuse blows yet get faster, more accurate protection against shorts and dangerous overloads when you use ECON Dual-Element Fuses. The exclusively different breakaway action of the ECON-Alloy element gives you this important advantage.

The ECON-Alloy thermo element has a double stop-watch action. First, it acts instantly on shorts. Second, with its pre-determined delayed timing, it safely handles overloads—up to 500%—without blowing.

Available in knife and ferrule types: 0 to 600 amperes, 250 and 600 volts. Underwriters' Laboratories Inc., approved.

ECON® DUAL-ELEMENT cartridge fuses

Write for ECON Dual-Element Catalog S-60...
or complete line folder on all Economy Fuses

ECONOMY FUSES FOR EVERY PURPOSE

1458

Ask your ELECTRICAL WHOLESALER for ECON Dual-Element and other Economy Fuses.

ECONOMY FUSE & MFG. CO., 2717 Greenview Avenue, Chicago 14, Illinois

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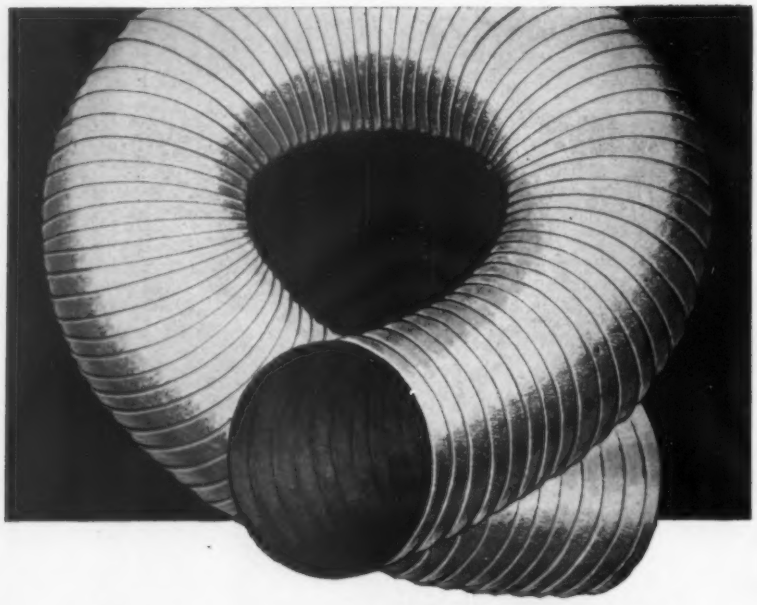


facts about Flexflyte®

that will help you solve your ducting problems

What is Flexflyte?
A lightweight, reinforced ducting made of a spring steel wire helix covered with coated fiber glass or a cotton fabric and bound with a fiber glass cord.

What are its applications?
Flexflyte is used for transmission of hot or cold air, fume removal, dust collection, materials handling, etc.

How flexible is Flexflyte?
It will take tight turns at any point up to 180° without buckling. No elbows or fittings are required.

Can Flexflyte be engineered for unusual applications?
Yes. Special fabrics, coatings, connections, lengths and diameters are available. Our special Silicone Department, working with automated machinery, is prepared to meet any requirement for silicone ducting.

Is it flame resistant?
Flexflyte has exceptionally high flame resistance and will not support combustion.

What about Flexflyte's resistance to abrasion?
It is highly resistant to abrasion, especially when coated with FT-506 which has more than 200 times the abrasion resistance of any tubing of its type and weight.

What about installation?
Flexflyte is quickly, easily installed by means of metal clamps. It is also available with special enlarging or reducing ends, either cylindrical, rectangular or polyhedral.

What are its temperature ranges?
From minus 120°F. to plus 650°F.

What pressures will Flexflyte handle?
Internal working pressures up to 70 psi and external working pressures up to 15 psig according to type.

How can I make sure that Flexflyte will solve my problems?
Write us, outlining your requirements. Our engineers will be glad to put their experience to work for you. Write Dept. 94.

Sold through industrial distributors from coast to coast.

Flexible Tubing
CORPORATION
GUILFORD, CONNECTICUT • LOS ANGELES 64, CALIFORNIA
For more facts circle 610 on Reply Card

NEW PRODUCTS

(Begins on page 168)

in. H_2O to 0-70 in. H_2O at maximum service pressure of 3500 psig. Range of pressure compensator is 0-2500 psig. Product Specification M31-2 gives data on the recorder. Bailey Meter Co.

36—CEILING LIGHTING offers variety of design

Sylva-Lume is a ceiling lighting system permitting a variety of custom designs from a few standard parts. It is a modular, interchangeable plastic panel system that may be designed in a variety of over-all patterns of color, form, texture and style. According to company, this system offers other advantages, too—suitability for functional interior design, economy as compared with custom-designed ceilings, and minimum number of components. It is described as a catalog system of

lighting which achieves custom results, and one, which can be changed or altered simply by re-arranging the shielding.

There are five major elements. First is the Outrigger, a ladder type, bare-lamp fixture. Its H-shaped frame is 8 or 6 ft long, and can be used for 4-ft or 8-ft fluorescent lamps. Each unit accommodates up to four lamps. Diffusers are 3-ft square vinyl plastic, light weight and fire resistant, and available in three designs and several delicate colors. The panels are single or double layered, in shallow, deep or drumhead style. Acoustic wedges or baffles are 3 ft by 5 in deep, of perforated steel with glass fiber fillings. They provide sharp color contrast. Perimeter panels are sheets of flat steel with swiss-cheese-type holes, backed by plastic. Available in 3-ft squares, they can be used as needed, and can be cut with tin shears. The track system is an extruded aluminum suspension grid hung from the fixtures. Cost of the new system is given as $2 to $3 per square foot for the ceiling. Sylvania Electric Products, Inc.

37—BLENDING METHOD for mixing bulk materials

This system of blending bulk materials to produce a uniformly homogeneous mixture in a continuous flow is suggested for such applications as blending coking coal for steel blast furnaces. Blending

USING

DU PONT ELASTOMERS

neoprene · Hypalon

in industry

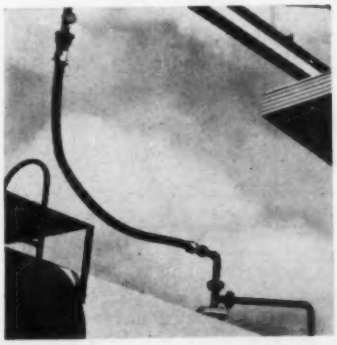
Bulk containers save shipper 1/3 cent per pound

HYPALON hose delivers sulfuric acid for over 4 years ... still in good condition

Acid hose lined with HYPALON has given over four years of trouble-free service in unloading 66° Be. sulfuric acid at a battery manufacturing plant. The hose is used three times a month to transfer the acid from tank trucks to rooftop storage tanks.

HYPALON hose is used for its outstanding resistance to strongly oxidizing chemicals and acids. This flexible hose eliminates time-consuming "spotting" of the tank trucks formerly required when rigid piping connections were used.

HYPALON synthetic rubber has many excellent properties which can help reduce your maintenance and replacement costs. Just fill out the coupon for more details.



This HYPALON-lined hose is used to fill storage tanks with concentrated sulfuric acid. Photograph taken at the Reading, Pennsylvania, plant of the Reading Batteries Division of Electric Auto-Lite Company.

Big neoprene bins replaced paper bags and cut labor costs to the bone. Internal lifting cables are connected to carrying ring in top. Tight closures keep contents clean and dry.

Neoprene bins withstand wear, tear and weather

A plastics manufacturer had been using paper bags to ship granular resin—about 250,000 pounds per month—from one of his plants to another. Now he ships in bulk in these 300-cu.-ft. containers and saves ⅓¢ per pound, mostly in reduced labor costs.

For example, seven containers can be unloaded from a gondola by lift truck and moved to their outdoor storage point in about half an hour. It took 16 man-hours to unload the same amount of resin in 1300 paper bags.

The bins are collapsed for return shipment and used over and over. Their heavy multi-ply wall construction is built for years of hard service. The outer ply is neoprene to take wear and tear and stand off the elements. A fabric carcass provides strength, and an inner ply protects the fabric from the contents. The inner ply is also neoprene in applications requiring better-than-average resistance to oils and chemicals.

For more information about the use of neoprene in bulk shipping containers – or its use in hose, gaskets, belting or protective coatings – just clip the coupon below.

DU PONT
REG. U. S. PAT. OFF.

HYPALON *is a registered trademark of E. I. du Pont de Nemours & Co. (Inc.)*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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☐ Please add my name to the mailing list for your free publication "The Du Pont Elastomers."

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Elastomer Chemicals Dept. PL-4
Wilmington 98, Delaware

Name _____ Position _____
Firm _____
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City _____ State _____

For more facts circle 611 on Reply Card

After nearly a decade of use, these PYREX lines show no corrosive damage. Low cost-per-year-of-service is a matter of routine. Cost for all maintenance is practically nil.

$6.32 annually for maintenance of 1600 feet of PYREX brand glass pipe

No corrosion after 9 years corrosive exposure

Compare your pipe maintenance history with that of the Ecusta Paper Division of the Olin Mathieson Chemical Corporation.

This Pisgah Forest, N. C. plant produces chlorine for their pulp and paper mill.

In 1947, Ecusta Paper installed 1½" glass pipe as brine feed lines, and 2", 3", and 4" glass pipe as spent brine lines.

Total cost for all glass line maintenance in the nine years to date amounts to $56.90, or $6.32 yearly. And the lines show no sign of corrosion.

Users of PYREX brand pipe have been making such reports as a matter of course for over 20 years. The materials they pipe include some of the most corrosive chemicals in existence, like chlorinated hydrocarbons, all acids (except HF), strong bases at low temperatures and weak bases at high temperatures.

If you handle corrosives, you will never know how little you can spend for maintenance and replacement until you install PYREX brand pipe. Our representatives will gladly work out a test setup with you and you call the terms on operating conditions.

In the meantime, write for Bulletin EA-3, "PYREX brand 'Double-Tough' Glass Pipe and Fittings."

Corning means research in Glass

CORNING GLASS WORKS

10-4 Crystal Street, Corning, N.Y.

For more facts circle 612 on Reply Card

NEW PRODUCTS

(Begins on page 168)

is done in a metal or concrete bin (any size, depending on requirements), containing a series of overlapping baffles which deflect out-flow to the sides of the container. Material to be blended is layered into the bin by a belt conveyor tripper on top of a rectangular bin, or a chute in the case of a cylindrical bin. While the bin is being emptied from the bottom the incoming material is directed into the side chute section in a continuous series of small increments from top to bottom. Blending thus takes place automatically as small portions of each layer enter the chute area and flow downward by gravity. At the bin bottom, material is removed from the outlet shelf by a plow or other device and taken away. Hewitt-Robins, Inc.

38—PUNCHES, CHISELS provide control and safety

These alloy steel punches and chisels are square shaped with beveled corners to provide a more comfortable surface for firm control and to prevent tool from rolling out of reach. Chisel edges are ground to a 70-deg angle to provide fast cutting for all general purposes. Punches and chisels are available in sets consisting of five starter punches and five drift punches $\frac{3}{32}$ to $\frac{7}{32}$ in., five chisels $\frac{1}{4}$ to $\frac{5}{8}$ in., and two sizes of center punches complete in kit bags. Snap-On Tools Corp.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 247-248. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

39—CONTROL makes boiler tube rolling easier

Incorporated in the Model C Torq-Air-Matic, an air-powered tube-expander drive and control, is a dial to provide control necessary for precise boiler-tube rolling. You set the desired torque (in foot-pounds) on the dial and start the rolling operation; when the desired torque is obtained, the expander automatically stops rotating. Joint tightness is always uniform, regardless of tube-sheet hole variation, it is claimed, and guesswork is taken out of tube expanding because the operator does not have to depend on expander resistance, motor sound, or "feel" to determine correct expansion. This feature is designed to make the tool easy to use and eliminates over- and under-rolling.

Model C is designed for a wide range of boiler tubes, from 1 to 2½ in. OD. Similar in principle to company's Model

For more facts circle 613 on Reply Card ⟶

On the Monongahela . . . New fireboat has Multigrip Floor Plate decks for all-weather safety!

The C. D. SCULLY, new Pittsburgh fireboat, has Multigrip Floor Plate on all exterior decks and ladders. Hull is made entirely of ¼-inch USS "COR-TEN" High Strength Steel.

Flat-topped, evenly spaced risers provide safe traction from any direction, even when the plates become wet. And, Multigrip won't chip, crack or splinter.

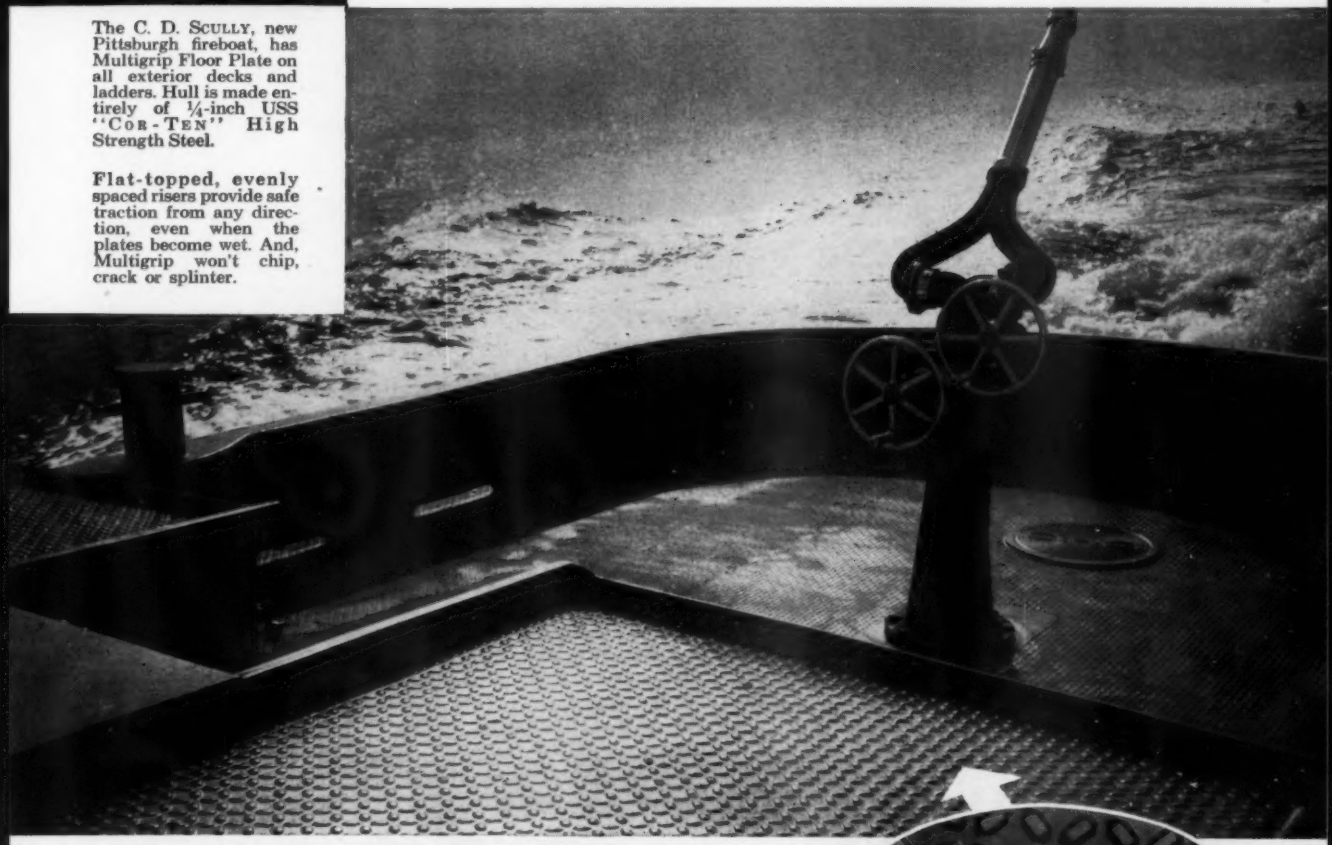
On Pittsburgh's new 65-foot fireboat, the C. D. SCULLY, all exterior decks and ladders are surfaced with USS Multigrip Floor Plate. Mr. Leo Gill, Director, Automotive Equipment, City of Pittsburgh, says that "safety and endurance dictated the choice." In the event of river or wharfside fires, the *"Scully"* will run in close, directing gushing streams of water into the fire. Wind-blown spray *could* make this a treacherous job for firemen manning the equipment.

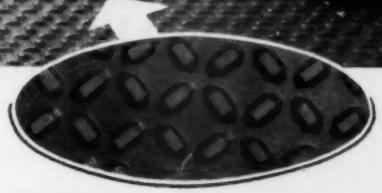
Risers Mean Safe Footing

Because Multigrip has clean-edged, flat-topped risers that are evenly spaced, firemen will be able to move about the decks safely, even when the plates are wet. In short, use of Multigrip has made the *"Scully"* a safer, more efficient fire-fighter.

Your Plant, Too

This application demonstrates how Multigrip adds long-lasting safety under extreme conditions, just as it can in your own plant. You'll find that Multigrip won't chip, crack or splinter, and it offers traction from any direction. Multigrip can be cut, welded or bent where necessary . . . and installation is *fast!* And large plates mean less installation waste. For safety and long service, specify USS Multigrip Steel Floor Plate for trucking aisles, ramps, loading platforms, stairs and entire floor areas.





USS multigrip

FLOOR PLATE

Sold by leading distributors from coast to coast

7-481

UNITED STATES STEEL CORPORATION, PITTSBURGH
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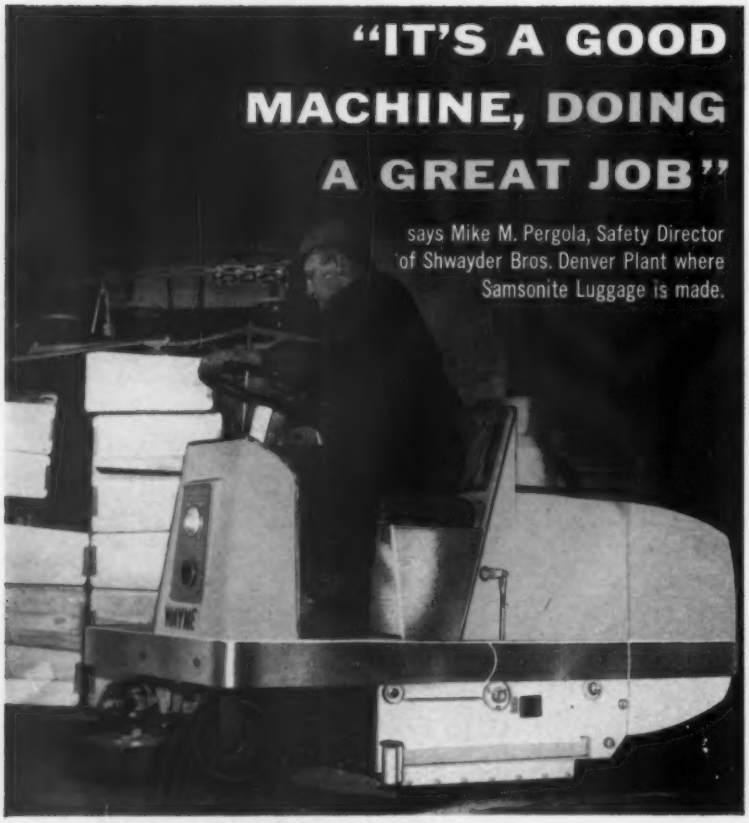
UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

UNITED STATES STEEL


"IT'S A GOOD MACHINE, DOING A GREAT JOB"
says Mike M. Pergola, Safety Director of Shwayder Bros. Denver Plant where Samsonite Luggage is made.

In the 350,000 sq. ft. Shwayder plant one Wayne Model 605 in 4 hours does work of 3 men working 8 hour shifts. The annual labor *saving* alone is over twice the cost of a Wayne.

now . . . you, too, can have a "Dinner Table Clean" plant

"FILTER-VAC" Dust Control
No dust bag to empty.

POWERED FOR GRADES
Geared for better sweeping.

300% GREATER EFFECTIVE CAPACITY with hydraulic dumping at rear of sweeper.

Whether your clean-up problem deals with hard-to-pick-up sawdust, plastic or cloth trimmings, as inside the Shwayder plant, or greasy dirt outside, a Wayne Sweeper will do the job faster, better and cheaper. Yes, even if your problem is metal filings, or cement dust.

And that is no idle claim, but a FACT now proved this past year in thousands of important industrial plants. Ask for a demonstration in your plant, and see for yourself what a Wayne can do.

No other sweeper is so efficient, so powerful, so trouble-free. LP gas, gasoline and electric models available.

WAYNE POWER SWEEPERS

WAYNE MANUFACTURING CO.
1225 E. Lexington Ave., Pomona, Calif.

☐ Please arrange to demonstrate a Wayne Sweeper.

☐ Please send me literature.

Name_____
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Company_____
City_____ Zone____ State_____

World's Largest Producer of Power Sweepers for Cities and Industries

For more facts circle 614 on Reply Card

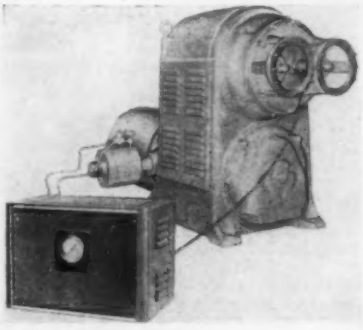
NEW PRODUCTS

(Begins on page 168)

A Torq-Air-Matic, announced earlier, the new model produces 75 ft-lb of torque —enough to roll 3-in. 10-gage tubes in a 5/8-in. thick sheet. An air hose is the only external connection. It weighs 26 lb, is 18 in. long, has a free speed of 200 rpm. Thomas C. Wilson, Inc.

40—V-S DRIVE holds speed despite load changes

Claimed capable of maintaining any speed in its range within ¼ of 1 per cent accuracy, regardless of load fluctuations, this drive is a packaged system consisting of company's Varidrive Variable Speed Motor or Varidrive Aero Test



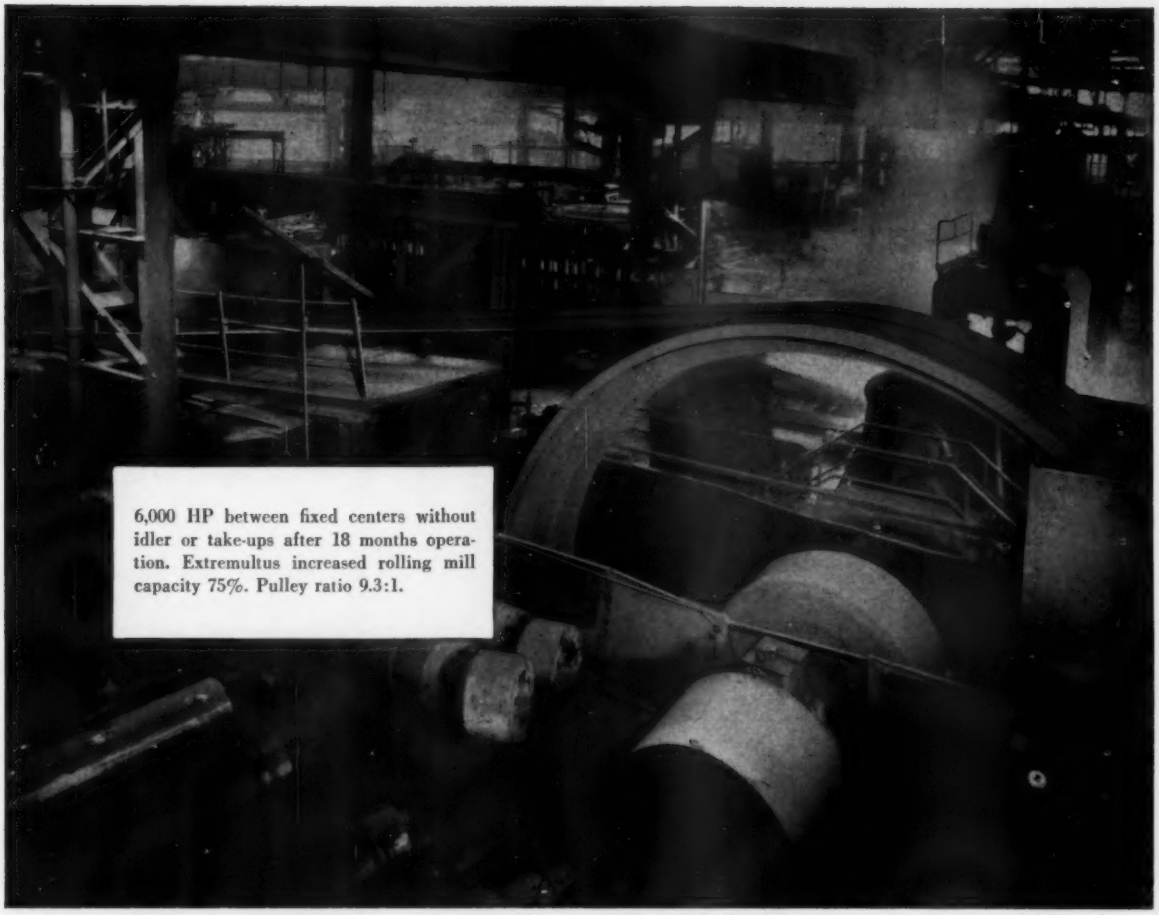
Stand and the new Speed Sensitive Varitrol, an automatic control package. The Varitrol operates on a tight loop, high response, feedback principle. This pneumatic control offers advantages of low initial cost, simplicity of construction and operation, minimum of maintenance, and inherent explosion-proof characteristics. It is pointed out that although designed primarily for company's test stand motors used for testing aircraft components, this speed sensitive control can be adapted to any Varidrive for industrial applications requiring exact speed regulation. U. S. Electrical Motors Inc.

41—CASTERS feature wing type wheel brake

Now available on 4- and 5-in. Diamond Arrow Casters is a wing type wheel brake. These casters are used in plate or stem construction on light work stands, portable ladders, conveyor sections. The brake lets the wheel be locked or released with a touch of the toe. The Bassick Co.

42—SEPARATOR takes foreign matter from air lines

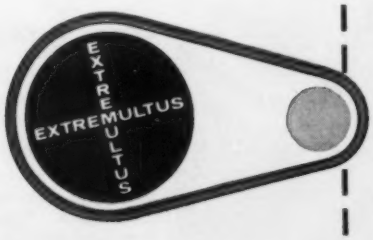
The Liqui-Jector, a liquid-gas separation device for removal of entrained liquids and solids from air, gas and steam systems, is now available in 12 standard sizes. It was previously furnished only as custom-built units. The Liqui-Jector is designed to provide clean dry air for protecting pneumatic instrumentation and pneumatically-operated tools and mechanisms and clean



6,000 HP between fixed centers without idler or take-ups after 18 months operation. Extremultus increased rolling mill capacity 75%. Pulley ratio 9.3:1.

This Belt Drive Transmits 6,000 HP

The rolling mill installation shown above is typical of the "impossible" belting problems which EXTREMULTUS solves with ease. This new belt, a combination of leather and plastic, is out-performing and replacing existing V-belts, chains and flat belts everywhere! EXTREMULTUS permits speeds to 10,000 ft. per min., ratios as high as 20:1, arcs of contact as low as 90°, unexcelled elasticity and shock absorption, a range from 1/10 to 6,000 HP! In addition, EXTREMULTUS requires widths a fraction of belts replaced, eliminates take-up because of its freedom from stretch, needs no idlers yet operates on standard pulleys! Write today for full information for the EXTREMULTUS answer to *your* toughest drive problem!



EXTREMULTUS, INC.
405 Lexington Ave., New York 17, N. Y.

Please rush full information on EXTREMULTUS for use on _____

Name _____

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Company _____

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For more facts circle 616 on Reply Card

NEW PRODUCTS

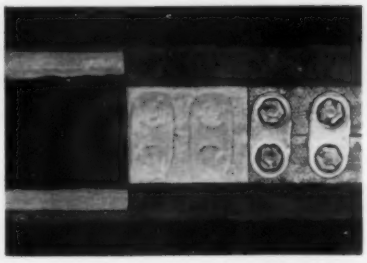
(Begins on page 168)

steam from ordinary boiler steam for cleaning of electrical equipment.

It operates by phase separation—trapping solids, and passing liquid in one direction and gas in another, without interrupting the flow through the line. Maintenance costs are reduced, it is explained, because there are no moving parts and no extra pipes or special fittings required. There is accessibility for cleaning and replacement, and the Liqui-Jector can be installed flush against the wall or in line with normal piping. Three standard models include Series A for volumes to 100 scfm gas at 150 psig; Series B for volumes to 7000 scfm gas at 200 psig; Series C for conditions in which large volumes of condensate are involved. Selas Corp. of America.

43—REPAIR MATERIAL for conveyor belt splices

It is now possible to cover or protect conveyor belt splices made with this company's Flexco Fasteners by using Rema, a self-vulcanizing rubber repair material. Two methods are used. In the first (illustrated), the fasteners are recessed in the belt and then covered



with Rema surface strips. This provides a smooth belt surface, especially desirable when plows or scrapers are used. Both top and bottom of belts can be protected this way, also rips.

In the second method, both ends of the belt are sealed with Rema Red Filler Sheeting before applying the fasteners. This is said to be a simple and effective way of minimizing deterioration of belt ends. Rema is claimed to seal out moisture, and reduce mildew rot and deterioration. Also it serves to prevent sifting and seepage. Flexible Steel Lacing Co.

44—METAL TREATMENT for cold galvanizing use

Galvoplate—a metal treatment for cold galvanizing—is described as a metallic coating of 95 per cent pure zinc base that combines with the base metal setting up electrical continuity and offering cathodic protection. It can be applied with either a brush or spray gun. Requiring no special pretreatment, it can be applied to any clean metal surface and can be

No costly maintenance problem here

Clean, trim-looking Johns-Manville Corrugated Transite side walls are used on this generating plant of a large utility in the upper midwest.

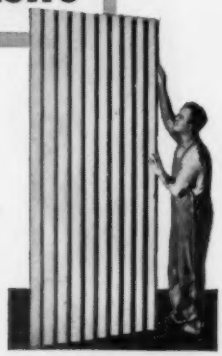
build with Johns-Manville Corrugated Asbestos Transite

For maintenance-free exterior walls and roofs, plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permit fast, economical construction of industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof and rotproof. Corrugated Transite is also used increasingly for interiors. The streamlined corrugations and attractive shadow lines offer interesting design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For free brochure, write Johns-Manville, Box 158, Dept. PE, New York 16, New York. In Canada, write 565 Lakeshore Road East, Port Credit, Ontario.



- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

See "MEET THE PRESS" Sundays on TV, sponsored by Johns-Manville. Consult your newspaper for time and station.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

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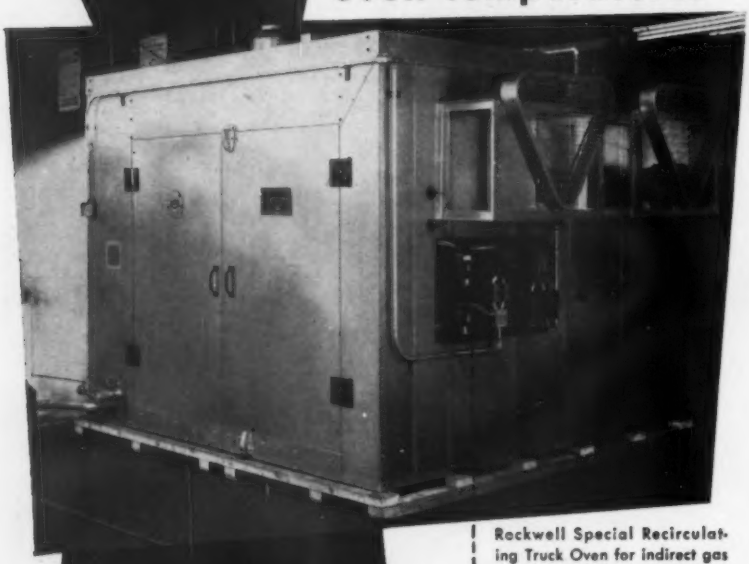
w. s. rockwell company depends on partlow controls for accurate oven temperatures



Rockwell Special Recirculating Truck Oven for indirect gas heating to 500°F. . . . with Partlow M2 Electric Indicating Control, and 02 Limit Control.

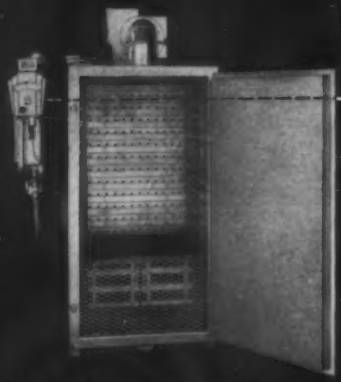
partlow

W. S. Rockwell Co., Fairfield, Conn., one of the oldest builders of industrial ovens, specifies Partlow Controls to insure the high standard of performance for which their ovens are famous.

There's a Partlow control . . . in the –30°F. to 1200°F. range . . . for use on your own product or in your manufacturing operations.

Available for use with gas, oil, steam or water valves; or electrical equipment.

Rockwell Standard Bench Oven with Partlow M2 Electric Indicating Control . . . range 50° to 350°F.



Rockwell Recirculating Bench Oven with Partlow JVS explosion-proof Indicating Electric Control . . . range 100° to 350°F.

partlow

the pioneer in mercury thermal controls

SEND FOR CONDENSED CATALOG

THE PARTLOW CORP.

Dept. PE-457

NEW HARTFORD, N. Y.

Offices in All Principal Cities

For more facts circle 618 on Reply Card

NEW PRODUCTS

(Begins on page 168)

used to arrest corrosion that has already started, company says, and in places where corrosion has started, it is only necessary to remove all loose scale before applying. It is said to give a smooth, hard surface that is abrasion resistant yet flexible. Galvoplate is packaged premixed, ready to use. Danton Corp.

To receive product data circle item number on the handy Reader Service Cards provided on pages 247-248.

45—ADHESIVE is quick-setting rubber-based liquid

Stick-N-Seal, a brushable, rubber-based liquid claimed to have outstanding initial tackiness and adhesion, is introduced as a quick-setting adhesive for use where gaskets or other material to be assembled must be held in place until the screws can be placed and tightened. Stick-N-Seal is not affected by gasoline and lubricants, says manufacturer, and can therefore be used as a permanent seal to keep out gasoline and lubricants. It is also reported to be resistant to water, glycol and kerosene, and to withstand pressures to 500 psi and temperatures from —40 to 200 F. Permatex Co., Inc.

46—OVENS permit loading down from the top

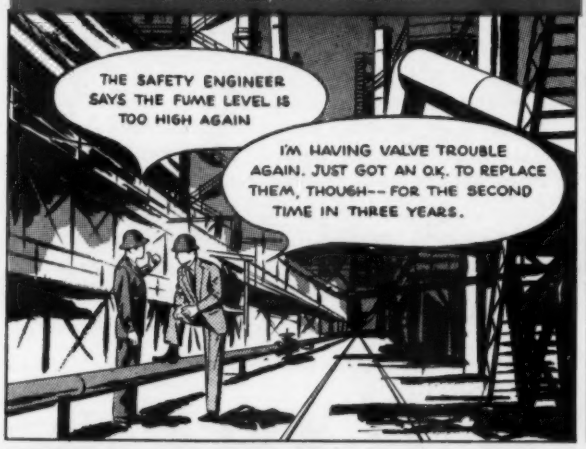
Designed to permit loading and unloading down from the top, either manually or by overhead hoist, these ovens are built to individual size requirements. The top opening door may be counterbalanced or not, as required. The ovens may be electrically heated or gas fired, and furnished with horizontal or vertical recirculating air flow pattern. Insulation is varied to suit temperature specified. Pilot lights show when blower and heater circuits are energized. Gas models have electronic combustion safety controls in conjunction with push button electric burner ignition. The ovens are supplied assembled, ready for service connection. The electrically heated model features adjustable horizontal air circulation through the work space. Grieve-Hendry Co., Inc.

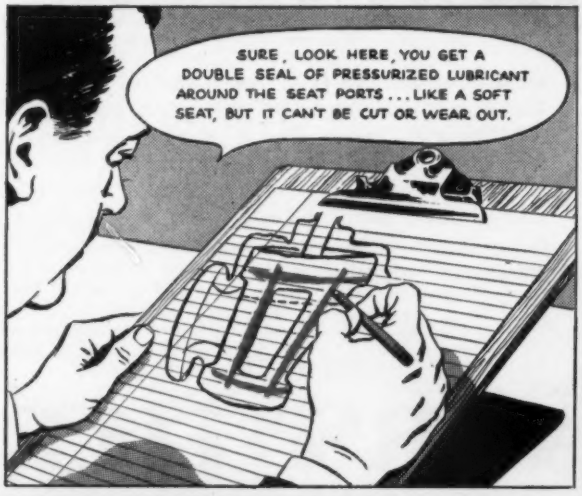
47—OIL SWITCH for remote control of capacitors

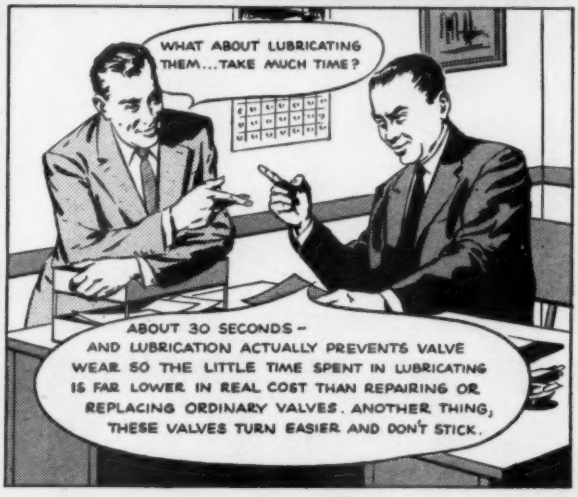
For economical switching of capacitors, outdoor lighting and load break applications, this oil switch is announced as a single-phase, 14.4 kv unit with continuous current rating of 200 amp, and a momentary rating of 9000 amp RMS symmetrical. Motor mechanism of the switch can be controlled by a thermostat, voltmeter, ammeter or time switch, and can be removed by loosening two mount-

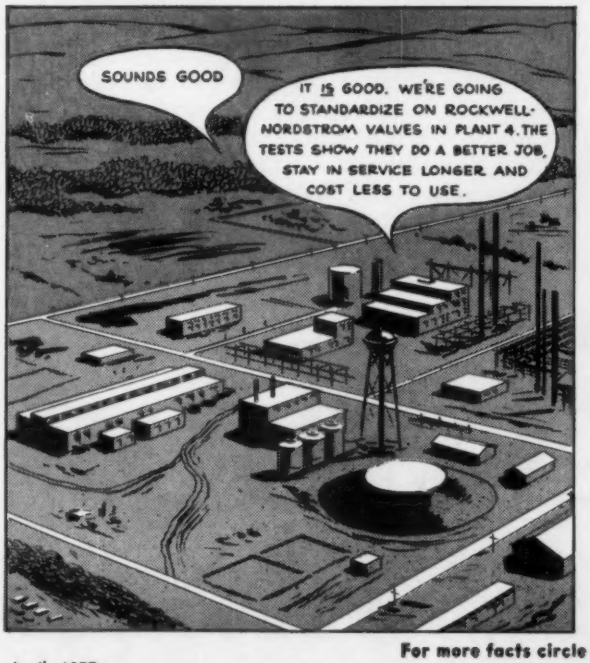
COST CUTTING IN ACTION

by Rockwell-Nordstrom


THE SAFETY ENGINEER SAYS THE FUME LEVEL IS TOO HIGH AGAIN
I'M HAVING VALVE TROUBLE AGAIN. JUST GOT AN O.K. TO REPLACE THEM, THOUGH-- FOR THE SECOND TIME IN THREE YEARS.


SURE, LOOK HERE, YOU GET A DOUBLE SEAL OF PRESSURIZED LUBRICANT AROUND THE SEAT PORTS... LIKE A SOFT SEAT, BUT IT CAN'T BE CUT OR WEAR OUT.


WHAT ABOUT LUBRICATING THEM...TAKE MUCH TIME?
ABOUT 30 SECONDS - AND LUBRICATION ACTUALLY PREVENTS VALVE WEAR SO THE LITTLE TIME SPENT IN LUBRICATING IS FAR LOWER IN REAL COST THAN REPAIRING OR REPLACING ORDINARY VALVES. ANOTHER THING, THESE VALVES TURN EASIER AND DON'T STICK.


SOUNDS GOOD
IT IS GOOD. WE'RE GOING TO STANDARDIZE ON ROCKWELL-NORDSTROM VALVES IN PLANT 4. THE TESTS SHOW THEY DO A BETTER JOB, STAY IN SERVICE LONGER AND COST LESS TO USE.

ROCKWELL-
Nordstrom
VALVES

LUBRICANT SEALED FOR POSITIVE SHUT-OFF

Rockwell-Nordstrom valves are available in a complete range of sizes and ratings in semi-steel, steel, stainless steel and other corrosion resisting metals.

Send Coupon For Free Literature

Rockwell Manufacturing Company
Rockwell-Nordstrom Valve Division
Department CS-2, Pittsburgh 8, Pa.

☐ Please send me complete information on Rockwell-Nordstrom valves for process, industrial and manufacturing flow control.

☐ Please send me the name of your nearest distributor . . . ask him (to) (not to) call immediately.

Name_____ Title_____

Firm_____

Street_____

City_____ Zone_____ State_____

For more facts circle 619 on Reply Card

STRONG

Extra weight capacity, maximum durability—and a saving of nine pounds per unit—are some of the advantages reported by Heidelberg Brewing Co., Tacoma, Washington, a user of fir plywood pallets since March, 1952. Comparison tests proved that 5,200 plywood pallets put into service have sharply reduced both handling costs and maintenance, and virtually eliminated mortality through actual pallet failure. Repair cost, the company reports, is negligible.

DURABLE

Resin-fiber overlaid fir plywood, used in construction of these electroplating cells, saved more than $30,000 in four years. The fir plywood acid tanks were built for $140 each, a saving of from $400 to $600 under rubber-lined steel tanks. Previous lumber tanks gave trouble with leakage, required heavy framing. Both objections were overcome by the overlaid-plywood units.

VERSATILE

Signs, fixtures, containers, re-usable concrete forms, complete buildings—these are only a few of the applications which use three to four carloads of fir plywood a month at Southern Pacific's huge central mill in West Oakland, California. W. R. Jones, superintendent of the 135-man shop, regards fir plywood as one of their most versatile and indispensable building materials.

DFPA TESTED QUALITY

FIR PLYWOOD

means quality construction

FOR MORE INFORMATION about uses shown above, design and/or specification data, mail coupon ——→

1. SPECIFY BY DFPA QUALITY TRADEMARKS

DFPA grade-trademarks appear only on plywood manufactured, inspected and scientifically tested under the DFPA quality control program. DFPA, Douglas Fir Plywood Association, is a non-profit industry organization devoted to product research, promotion and quality maintenance.

2. CHOOSE THE RIGHT GRADE FOR EACH JOB

Fir plywood comes in two types: 1. *Exterior* (waterproof glue for permanent exposure to water or weather); 2. *Interior* (moisture-resistant glue) for indoor uses, crating, sheathing, maintenance. Within each type are several grades – i.e., panels with one good side, two good sides. Most popular grades are shown below.

EXT-DFPA — Exterior plywood for permanent outdoor uses

PlyPanel® for paneling, most indoor uses

PlyScord® is unsanded panel for sheathing, crating, bins, etc.

PlyForm® concrete form grades come in Exterior and Interior types.

SPECIALTY PANELS include 1. *Overlaid Exterior plywood* (hard, smooth, abrasion-resistant fused resin-fiber surfaces) for siding, signs, tanks, concrete forms; 2. *Textured panels* with smart grooved, brushed or striated surfaces for fixtures, siding, special decorative effects.

DOUGLAS FIR PLYWOOD ASSOCIATION
Tacoma 2, Wash. (Good USA Only) Dept. 179
☐ Please send basic fir plywood specification data.
☐ Also send information about use of fir plywood for.....
Name
Firm
Address
City Zone State

For more facts circle 620 on Reply Card

NEW PRODUCTS

(Begins on page 168)

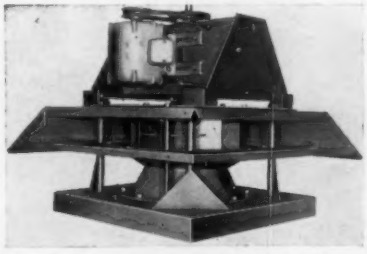
ing screws. Nitrile rubber gaskets on cover and bushing are used for sealing. The operating shaft handle utilizes a "one-way" seal to permit venting of internal pressure and minimize thermal-cycle breathing. Reduced maintenance is attributed to use of a printed circuit in the operating mechanism which reduces number of mechanical links normally associated with the operating mechanism. The tank of this switch is one-piece drawn steel, supplied with about 1½ gal of inhibited oil. General Electric Co.

48—LIQUID ADDITIVE makes leak-stopper of cement

Flextite is announced as a liquid chemical additive that makes a fast-acting leak-stopper out of ordinary cement. It regulates the setting time of Portland Cement, company says, making it possible to stop direct leaks almost instantly. Flextite mortar is said to be equally effective as a water resistant plaster coat that seals off seepage and excludes moisture in damp, wet basements, pits, etc. It is claimed excellent for pointing up spalled areas or reforming exposed reinforcing bars or beams. Whether used as a leak-stopper or plaster coat, Flextite mortar works equally well on concrete, masonry or brick surfaces, company points out, and is ideal for handling leakage in elevator pits, basements, tanks, reservoirs, engine rooms. Flexrock Co.

49—ROOF VENTILATOR is centrifugal type

Distinguished by a jet siphon feature, the Centrilator is a centrifugal type power roof ventilator. Stability, high efficiency and quiet operation are attributed to such design features as the jet siphon, and streamlined air flow. Also, the Centrilator is designed to



give high static pressures (up to 2 in.). It is thus suited for applications where ductwork or hoods may impose considerable resistance, as well as for light-duty use without ductwork.

Four lifting lugs facilitate handling and a pipe is provided for the wiring. Four bolts secure the unit to the roof. Requiring only a low curb, the Centrilator has a low overall height when installed. It is built in 10 standard sizes, capacities to 26,400 cfm. Bulletin 550 gives details. Clarage Fan Co.

50—CATERPILLAR DRIVE for cable conveyors

Applied on the straight run of this company's overhead cable trolley conveyors, this drive allows large-radius traction wheel turns to be used. As a result, company states, sizable loads can be handled on close hook centers. This caterpillar drive has two strands of chain with special dogs that engage the cable and trolley with equal pressure from both sides. Side thrust is carried by both chains, so that cable movement is transmitted smoothly during engagement. There is claimed to be no tendency for trolley to cling to drive dogs on disengagement when using the double caterpillar feature. Drive sheaves are timed with bevel gears. The enclosed worm gear unit, variable speed drive and motor make a compact, efficient unit, it is pointed out. Traction wheels of large radii guide the cable around idler corners and permit clearance of large packages. The E. W. Buschman Co.

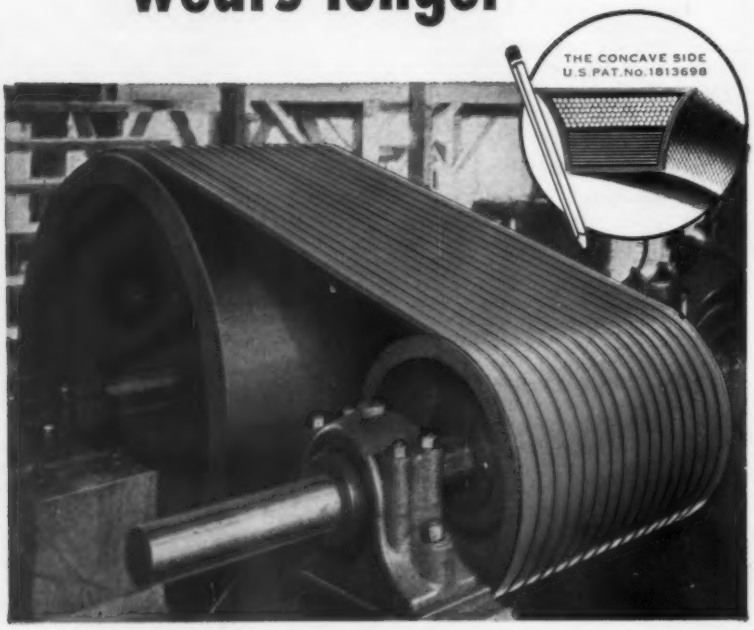
51—PACKAGED KITS of machine key stock bars

The 7-11 Mak-A-Key Kit contains seven genuine machine key bars of different sizes which may be filed to fit 11 different keyways. Made of zinc-coated cold-finished steel, the machine key bars are described as greaseless, clean to handle. Manufacturer says they "mike" 0.000 in. to + 0.003 in. oversize in both dimensions to assure snug fit in all keyways; the ends are machine cut sharp and square. DeVan-Johnson Co.

52—AFTER COOLER cools and dries compressed air

Announced as a more economical design Aero After Cooler, this large capacity unit offers a self-contained method of cooling and removing moisture from compressed air, independent of a large supply of cooling water and replacing both shell and tube cooler and cooling tower. It also combines in one machine provision for cooling compressed air and also for cooling water in a closed system for intercooler and compressor jackets. The apparatus consists of two parallel mounted cooling coils (one for jacket water and one for compressed air) in separate castings joined to a central plenum. Sprays of recirculated water constantly drench these coils. Evaporation transfers heat of compression, at rate of about 1000 Btu per lb of water evaporated, to air stream. Air enters above coils, travels down through them

Why a V-Belt with CONCAVE SIDES wears longer



It is easy to demonstrate to yourself why the concave sides (Fig. 1) of the Gates belt greatly lengthen belt life.

Simply bend a Gates belt and feel the sides. Notice how these precisely engineered concave sides *fill out* on the bend and *become straight*. Thus a Gates belt grips the sheave groove evenly (Fig. 1-A) and wear is distributed uniformly across each side of the belt. That means longer belt life; lower costs.

Make the same test with a straight-sided belt (Fig. 2) and see what happens. The sides bulge out on the bend (Fig. 2-A) concentrating the wear at points shown by arrows.

To assure longer wear and keep belt costs down, specify the V-belt with Concave sides—Gates Vulco Rope . . . readily available from nearby distributor stocks. The Gates Rubber Company, Denver, Colorado—*World's Largest Maker of V-Belts.*

There are Gates Engineering Offices and Distributor Stocks in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA 90

Gates VULCO ROPE Drives

For more facts circle 621 on Reply Card

NEW PRODUCTS

(Begins on page 168)

and moves into central plenum dropping its entrained moisture, then turns upward and is ejected by a propeller fan.

Compressed air is cooled to a point close to wet bulb air temperature, it is explained. hence it is always cooled below ambient dry bulb temperature and no further condensation of moisture takes place in exposed air distribution lines. Jacket water is cooled to optimum temperature, controlled by modulating intake of outdoor air with dampers which automatically adjust capacity to cooling load and to outdoor wet bulb temperature. Shipping of cooler casing in flat panels reduces freight cost, and additional economies in installation and maintenance are noted. Installation may be indoor or out. Four sizes have capacities to 23,000 cfm of free air cooled from 275 to 85 F at 75 F wet bulb atmospheric air. Niagara Blower Co.

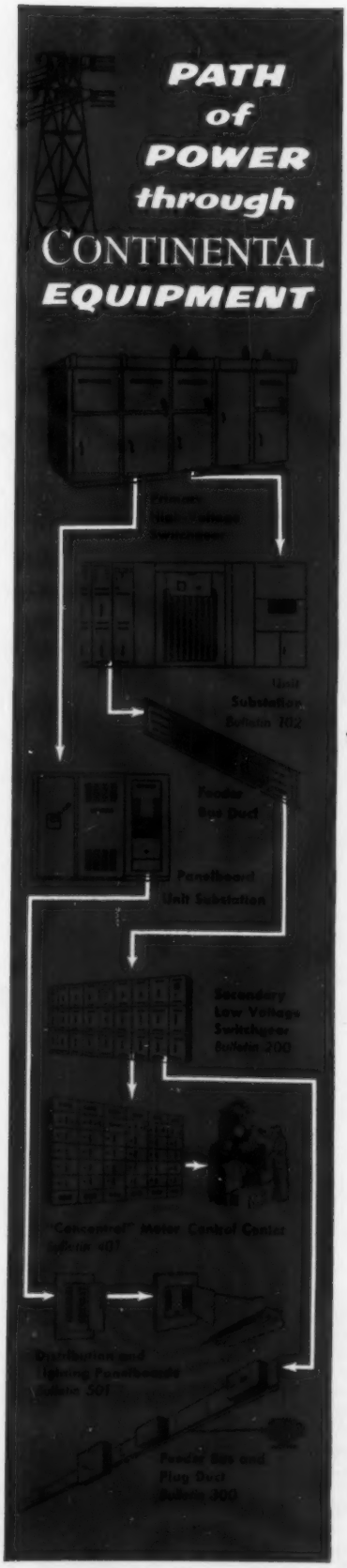
53—FASTENING SYSTEM gets buildings up faster

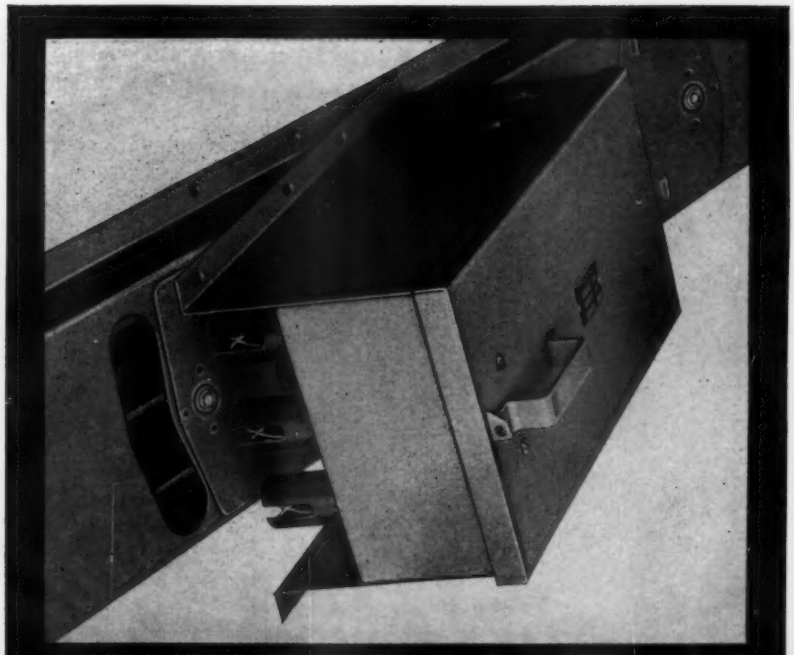
An embossed hole fastening system is announced as making it possible for one man, working on the outside, to install roof and wall sheets on company's steel buildings. With this system, automatic and uniform location of

fastenings is said to be assured, eliminating on-the-job drilling. An impression is formed on the outside of the wall or roof panel by striking with a mallet over a prepunched extruded hole in the grit or purlin. Once this impression is made, the proper screw location is readily determined, without scaffold work from the inside. After the screw location is found, the hole is punched in the spot marked by the impression in the roof or wall panel. When a sheet metal screw with Neoprene washer is applied, the extruded hole provides a raised area which fits tight against washer to make a weather-tight seal. Steelcraft Mfg. Co.

54—PUMP-MOTOR is compact, economical unit

Developed to meet the needs of original equipment manufacturers with unusual space and weight limitations, the little Powermite combines a positive displacement internal gear rotary pump, a driving motor, and a cooling blower



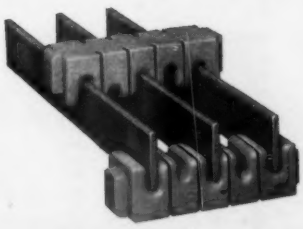


Relocate Power in MINUTES not days with "PLUG DUCT"

CONTINENTAL pre-fabricated Plug Duct systems slash non-productive labor costs by quickly and easily providing power to relocated machines. Wide variety of fittings and accessories allows installation in any plane or direction. Copper or aluminum conductors are standard on all sizes.

Standard lengths and fittings immediately available from authorized distributor stock or factory warehouse.

- **Completely Safe**
- **Fast, Easy Installation**
- **Plug-in Every 12 Inches**
- **Low System Resistance**
- **Up to 100% Salvagability**



TWICE AS MANY INSULATORS AT HALF THE USUAL SPACING

for greater electrical and mechanical strength.

Compare for yourself. Write for detailed specifications today.

CONTINENTAL ELECTRIC EQUIPMENT CO.

General Offices: 206 West 4th St., Cincinnati 2, Ohio

Manufacturing Plants in Ludlow, Ky. and Tampa, Fla. Sales Engineering Offices in all Principal Cities

For more facts circle 622 on Reply Card

In concrete or steel...you can set fastening studs *in seconds* with the REMINGTON STUD DRIVER

THERE'S NO TIME LOST on a construction fastening job with the Remington Stud Driver. You can set up to 6 studs per minute with this powder actuated tool—every stud arrow-straight!

And here's more news: you can set *both ¼" and ⅜" diameter studs.* You have a choice of 40 styles and lengths of Remington Studs in both diameters—a choice of 22 or 32 caliber power loads. All it takes is 90 seconds to change barrels and you're ready for practically *every* fastening job—light, medium or heavy duty!

Once you see the Remington Stud Driver in action you'll be convinced that here is the easy, economical way to fasten door bucks, furring strip—any of dozens of fixtures—to steel or concrete. Why not ask your distributor for a demonstration? For more information, just mail the coupon below.

Remington DUPONT

Industrial Sales Division, Dept. PE-4
Remington Arms Co., Inc., Bridgeport 2, Conn.

Please send me your free booklet which shows where and how to use the cost-saving Remington Stud Driver fastening method.

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 623 on Reply Card

NEW PRODUCTS

(Begins on page 168)

in a space only 8½ by 4¾ in. A single shaft serves all units. This pump-motor has a capacity of 18 gph at 300 psi and is driven by a 1/12 hp motor at a speed of 1750 rpm. Powermite can be furnished, in large production runs only, in a variety of pump and motor combinations. They may be supplied with a cooling blower as shown. A shaft extension (for driving other accessories) may be supplied, if desired. Tuthill Pump Co.

55—FLOWMETER measures hard-to-handle fluids

The VAF-Brooks Positive Displacement Flowmeter is reported suitable for hard-to-handle fluids such as bunker oils, still bottoms and asphalt. The meter is available in sizes from 1 to 6 in. or up to 450 gpm capacity—temperatures to 660 F and pressures to 600 psi. Accuracies are given as ¼ per cent in 1 in. sizes, and ½ per cent in 2- to 6-in. size meters. Bulletin 400 gives more details on the instrument. Brooks Rotameter Co.

56—PASSENGER TRAILER for trackless train use

One solution to the problem of transporting visitors to remote plant areas is the use of gas or electric tractors towing one or more trailers. It is for this

service that the Type A-335-6M Passenger Trailer was developed. Although it is standard with seating for six, it can be modified to provide 9-passenger seating. Standard bus-type seating and shock absorbing casters have been incorporated in the design. Platform is 40 in. wide, 102 in. long and 15 in. high. Its deck is 10-gage steel plate. Trailer has a socket-type hitch. Mercury Mfg. Co.

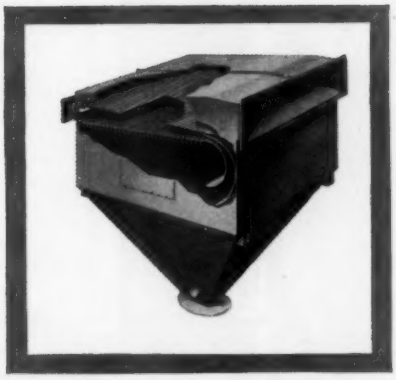
57—LIGHTED SWITCH serves a double purpose

This dual-purpose, lock-down switch (the 52PB7-T2) functions as a conventional pushbutton type when pushed straight down. When pushed and turned 20-deg clockwise, the switch is maintained in the operated position. When turned counter-clockwise from this position, the switch pops up to unoperated position. In many applications, company points out, this feature will let the switch function as two switches in one. It can take the place of an alternate-action pushbutton and provide optional momentary action.

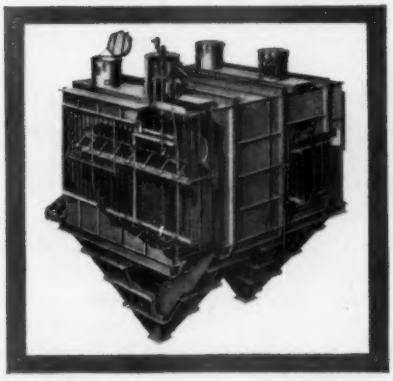
A subminiature bulb, independent of

How Buell's Shave-off tips the scales for Extra Dust Collection Efficiency

Side entry of dust-laden gases through Buell-designed manifolds minimizes turbulence, raises efficiency even higher in Buell cyclones. Large-diameter design eliminates clogging and bridging. Heavy plate construction assures years and years of extra service life without repair or replacement.



Buell's Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for either natural or mechanical draft installations. Ideal for boilers from 100 to 2000 BHP.



SF Electric Precipitator, a Buell exclusive, also delivers *extra efficiency* due to unique Spiralectrodes and Continuous Cycle Rapping of collecting electrodes.

For more specific data about Buell's *extra efficiency*, write Dept. D-14, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

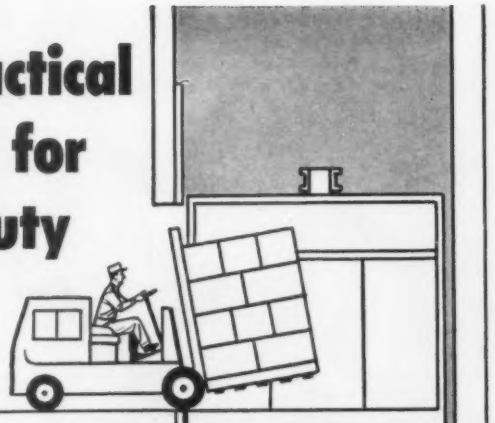
buell®

MECHANICAL ELECTRICAL

Experts at delivering Extra Efficiency in **DUST COLLECTION SYSTEMS**

For more facts circle 624 on Reply Card

Most practical elevator for heavy-duty service



Dependable hydraulic operation saves on installation and maintenance expense

For the shocks and jolts of heavy-duty service, there's no more dependable elevator than the Rotary Oildraulic.

It's pushed up and supported from below by a powerful hydraulic plunger that won't "give" with sudden heavy loads . . . isn't affected by off-center weights. With a Rotary Oildraulic Elevator there's no overhead machinery and no expensive cables to be inspected and replaced periodically.

Economy and efficiency have been proved in thousands of installations. Check these other features and send the coupon below for full information:

- No costly, ugly elevator penthouse
- Lighter shaftway construction
- No special machine room required
- All adjustments quickly made on one central control unit
- Automatic floor leveling
- Consistently smooth performance
- Any type of control system desired
- Capacities from 1000 to 100,000 lbs.
- Easily installed in new or old buildings
- Parts and service available throughout the nation

MAIL NOW FOR MORE DATA

Rotary®
OILDRAULIC® ELEVATORS
Rotary Lift Company
Division of the Dover Corporation
Memphis, Tenn.—Chatham, Ontario

ROTARY LIFT CO.
1020 Kentucky, Memphis 2, Tenn.

Send complete information on ( ) freight ( ) passenger elevators to:

*Name*_____

*Address*_____

_____

For more facts circle 625 on Reply Card

NEW PRODUCTS

(Begins on page 168)

the switch circuit, illuminates the switch's translucent button, offering compactness of built-in indication. The position of the button, locked down or unoperated, gives additional indication. The two subminiature basic switches, actuated by positive overcenter snap-action, are UL listed at 5 amp 125 or 250 v a-c. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

One of these products may be "just what you're looking for." Use the handy Reader Service Cards to ask for more information on it.

58—U-BOLT CLAMPS serve range of cable sizes

These heavy-duty U-bolt clamps, the 580 Series, employ universal, parallel spacer grooves and can be used on many cable sizes. The six clamps can be used on ACSR from No. 2 to 715.5 mcm, and will also handle No. 2 to 800 mcm stranded aluminum conductor, company announces. All proportions—length of clamps, number of bolts, bolt sizes—are engineered for range of conductor size to be accommodated and job to be done. The U-bolt portion, flattened to reduce bulk, serves to provide wrap-around strength and even pressure distribution. Aluminum Co. of America.

59—VERSATILE CRANE is economical, easily installed

Weighing about 135 lb, the E-Z Lift Crane is of all steel construction and reported easily installed. The crane can rotate in a complete circle, has a regular I-beam boom, a heavy pipe mast, a lock bolt to restrain swing, when required, and a 10-ft lift on the hoist. It costs around $100 complete, or approximately $70 without the hoist. Bacon Crane & Hoist Corp.

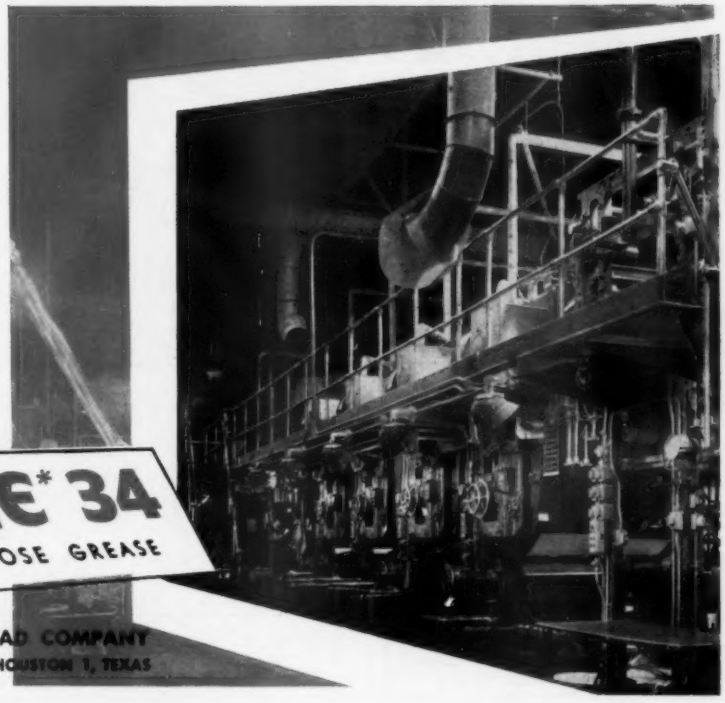
60—AIR CONDITIONERS offer style, safety features

Advanced styling and numerous safety devices are announced for this company's 1957 line of packaged air conditioners, available in six ratings from 3 to 20 tons. Heavy-gage furniture steel is used for cabinet construction; it is coated with a rust-resistant primer and finished with gray metallescent enamel. Inside the unit is a new sloped cooling coil design, said to permit greater cooling area for a given coil size. Performance characteristics of the sloped coil design are augmented by use of spiral aluminum and staggered copper tubes. According to company, the greater air-coil contact achieved results in better heat and moisture transfer; also the new units feature

BENTONE*34 based greases

resist leaching and cut costs

High-speed printing machinery poses a typical tough lubricating problem: what grease will stand up where the bearings are washed by solvents, thinners and leaching solutions? The Art Gravure Corporation of Cleveland, Ohio, standardized on grease made with Bentone* 34 and found that it stays in place, cuts maintenance cost, needs less frequent lubrication. Write for data and list of suppliers of grease made with non-soap, metal-adhesive Bentone 34.



BENTONE* 34
FOR MULTI-PURPOSE GREASE

* TRADEMARKS REGISTERED

BAROID DIVISION • NATIONAL LEAD COMPANY
5732 P. O. BOX 1675 HOUSTON 1, TEXAS

BENTONE* 34 Grease Manufacturers and Distributors

THE ACME REFINING CO., Cleveland, Ohio
ADAM COOKS SONS, INC., Linden, N. J.
ALEMITE DIV., STEWART-WARNER CORP., Chicago, Ill.
ALLUBE CORP., Glendale, Calif.
THE AMERICAN LUBRICANTS CO., Dayton, Ohio
ARKANSAS FUEL OIL CORP., Shreveport, La.
BATTENFELD GREASE & OIL CORP., Kansas City, Mo.
BATTENFELD GREASE & OIL CORP. OF CALIFORNIA, Compton, Calif.
BATTENFELD GREASE & OIL CORP. OF NEW YORK, North Tonawanda, N. Y.
BEL-RAY CO., INC., Madison, N. J.
BOBBISH INDUSTRIAL PRODUCTS CO., Dearborn, Mich.
THE BROOKS OIL CO., Pittsburgh, Pa.
CASCADE PETROLEUM CO., Denver, Colo.
CATO OIL AND GREASE CO., Okla. City, Okla.
CONSUMERS COOPERATIVE ASSOCIATION, Kansas City, Mo.
CRAWFORD EMULSIONS, Pittsburgh, Pa.
DENS-OIL LUBRICANT CO., Kansas City, Mo.
JAMES W. DOYLE CORP., Detroit, Mich.
FISKE BROTHERS REFINING CO., Newark, N. J.
FISKE BROTHERS REFINING CO., Toledo, Ohio
THE FRANKLIN OIL AND GAS CO., Bedford, O.
GEORGIA-CAROLINA OIL CO., Macon, Georgia
GLOBE GREASE & MFG. CO., Los Angeles, Calif.
GOPLERUD LUBRICANTS CO., Mason City, Iowa
GREDAG, INC., Niagara Falls, N. Y.
HI-WAY REFINERIES, LTD., Regina, Sask., Canada
THE HODSON CORP., Chicago, Ill.
THE HODSON CORP. (QUEBEC), INC., Three Rivers, Quebec, Canada
E. F. HOUGHTON & CO., Philadelphia, Pa.
ILLICO INDEPENDENT OIL CO., Lincoln, Ill.
INTERSTATE OIL CO., Kansas City, Kansas
KEYSTONE LUBRICATING CO., Philadelphia, Pa.
LUBRICATION CO. OF AMERICA, Los Angeles, Calif.
MacMILLAN OIL CO. OF ALLENTOWN, Allentown, Pa.
MAGIE BROTHERS, INC., Chicago, Ill.
MAGNUS CHEMICAL CO., Garwood, N. J.
MANITOBA CO-OPERATIVE WHOLESALE LTD., Winnipeg, Man., Canada
METALCOTE OIL CO., St. Paul, Minn.
MID-STATES LUBRICANTS, Kansas City, Mo.
MIDWEST OIL CO., Minneapolis, Minn.
THE OHIO GREASE COMPANY, Loudonville, O.
OIL-KRAFT, INC., Cincinnati, O.
OIL DISTRIBUTORS OF PHILADELPHIA, Philadelphia, Pa.
ONYX INTERNATIONAL, Jersey City, N. J.
PANTHER OIL & GREASE MFG. CO., Fort Worth, Texas
PANTHER OIL & GREASE MFG. CO. OF CANADA, Toronto, Ontario, Canada
PENN-CREST OIL & GREASE CORP., Long Island City, N. Y.
PENN PRODUCTS CO., DuBois, Pa.
PHOENIX OIL COMPANY, Augusta, Ga.
A. B. PLATING SUPPLY CO., Milwaukee, Wisc.
PRAIRIE STATES OIL & GREASE CO., Danville, Ill.
PRECISION BEARING & TRANSMISSION CO., Omaha, Nebr.
RILEY BROS., INC., Burlington, Iowa
THE SAHARA OIL CO., DuQuoin, Ill.
SASKATCHEWAN FEDERATED COOP. LTD., Regina, Sask., Canada
ADOLF SCHMIDS ERBEN S. A., Bern, Switzerland
SERVICE LUBRICANTS, INC., Chicago, Ill.
L. SONNEBORN SONS, INC., New York, N. Y.
SOUTHWEST GREASE & OIL CO., INC., Wichita, Kan.
SOUTHWESTERN PETROLEUM CO., Fort Worth, Texas
SPECIALTY PRODUCTS CO., Jersey City, N. J.
SUNLAND REFINING CORP., Fresno, Calif.
SYRACUSE FIRE BRICK SUPPLY, Syracuse, N. Y.
THREE RIVERS REFINERY, Three Rivers, Tex.
TIDE WATER ASSOCIATED OIL CO., N. Y. C.
TIONA PETROLEUM CO., Philadelphia, Pa.
TOPSALL LUBRICANTS, INC., Kenmore, N. Y.
TOWER OIL CO., Chicago, Ill.
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TRI-STATE PETROLEUM CO., Philadelphia, Pa.
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UNIVERSAL AVIATION SUPPLY, Wichita, Kan.
G. C. WAKEFIELD & CO., LTD., Toronto, Ontario, Canada
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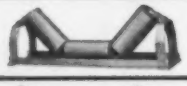
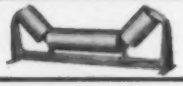
*T.M. Reg.

BENTONE·34®

For more facts circle 626 on Reply Card

MATCH IDLERS TO THE JOB

. . . it's easy when you choose from industry's most comprehensive line

IDLER SERIES	TYPE OF IDLER DUTY	TYPICAL APPLICATIONS
90	The economy idler for intermittent or light service . . . for fine or small lump materials.	Cottonseed plants, rice mills, etc. For non-corrosive, non-abrasive, light materials.
NEW 50	General conveyor service for maximum loads of 100 lbs. per cu. ft.—moderate lump sizes.	Provides correct capacity for medium loads or intermittent duty.
100	"Work horse" for round-the-clock action . . . handles all but the heaviest and coarsest materials.	Coal, coke, sand, gravel, iron ores, sinter, taconite, potash.
600	Developed specifically for handling grain and similar light materials requiring light belts.	Grain handling . . . low headroom applications . . . design coincides with approved grain elevator practice.
 400	For continuous service. Carries the greatest volume of material per lineal foot of belt.	Wood chips — chemicals — high-capacity application where low headroom is a factor.
 500	Often the most economical for continuous service. Carries more than the 100, less than the 400.	Serves same field as the 400, but where less capacity is handled and headroom is not a factor.
200	For continuous service, carrying the heaviest, coarsest materials on heaviest permissible belts.	Heavy ores, such as iron, copper, etc. . . . on conveyors employing high-capacity belts.

LINK-BELT SERIES 100 IDLERS on this 42-in. wide, 218-ft. long belt conveyor carry 800 tph of ore from primary screens to stock pile.

TO TRAIN YOUR BELTS for proper operation . . .

BELT TRAINING IDLERS Left, positive action type trains and protects single direction belts. Actuating disc type at right is best for reversible conveyors. Self-aligning idlers of both types are also available for return run.

RETURN BELT IDLERS support the empty belt on the return run.

TO PROTECT THEM IN SERVICE

TROUGHED RUBBER CUSHION IDLERS (right) absorb impact under loading points, when large lumps and heavy materials are loaded on belt. Rubber tread return idlers, at left, simplify handling of tenacious materials.

LINK-BELT

BELT CONVEYOR IDLERS

WHETHER you handle cottonseed or coal—Link-Belt makes the exact size and type of belt conveyor idler you need. For top performance . . . lowest per-ton handling cost—see your nearby Link-Belt office or authorized stock-carrying distributor. Ask for Data Book 2416.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville (Sydney), N.S.W.; South Africa, Springs. Representatives Throughout the World. 14,489

For more facts circle 627 on Reply Card

NEW PRODUCTS

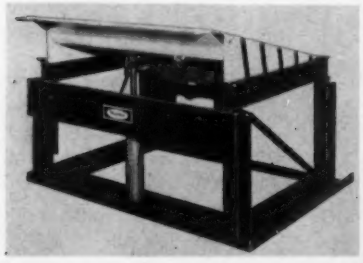
(Begins on page 168)

a more efficient draw-through air flow design which contributes to increased cooling capacity.

To provide protection for operating components, overload cut-outs are part of the compressor motor and fan motor circuitry. The compressor has a thermal cut-out which acts to cut off motor should temperature exceed a predetermined limit. The condenser has a fusible plug which melts to release refrigerator from the system in the event of excessive pressure build-up. Pressure controls are provided. American Blower Corp.

61—DOCK RAMP is portable, self powered

Suggested for use where dock area is a problem, the low cost, Port-O-Dock requires only accessibility of a 110-v electrical outlet; it needs no pit construction, altering of loading platforms, or permanent connections. This port-



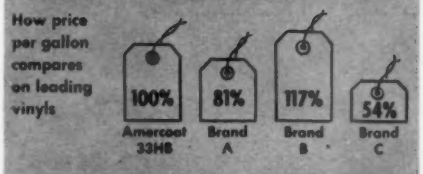
able dock consists of two units. The main unit, or platform, is the same as company's standard Dock-O-Matic, and available in 10,000- and 20,000-lb capacities and varying sizes. A frame unit contains and supports the entire dock, allowing it to be moved to any location. This frame is of structural members fabricated and welded into a compact unit. It is adjustable to dock heights from 42 to 60 in, and constructed so that wood or rubber bumpers can be installed. The power cylinder is a single action piston type hydraulic assembly. The power unit is a self-contained motor pump and activating mechanism located on the underside of the Port-O-Dock platform. The Wayne Pump Co.

62—TORQUE CONVERTER for high speed engines

The 1300 Series Single-Stage Torque Converter is designed for high-speed diesel and gasoline engines, those producing from 30 hp at 1450 rpm to 212 hp at 3200 rpm. Specific torque ratings are 165, 200, 240, 285 and 330 lb-ft, depending on impeller blading selected. Maximum input torque is 350 lb-ft.

Characteristic of this company's single-stage design, the 1300 Series features "unloading" of the engine through a blade design in which the

YOU CAN'T KNOW what the real price tag is...



UNLESS YOU compare mil sq. ft. per gallon and...

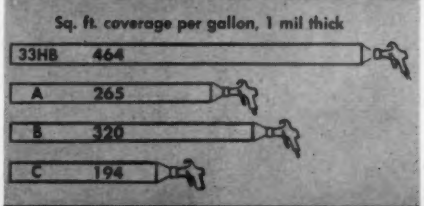
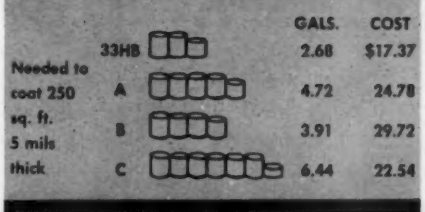
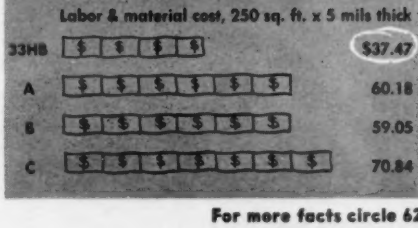


FIGURE THE material cost of each coating, then get the...



REAL COST by adding labor for the number of coats needed.



Announcing...
A True High Build Vinyl Coating

Amercoat 33HB now gives you even *more* "mils per gallon" —and at the lowest cost of any leading vinyl!

At last, the two major limitations of vinyl protective coatings—critical adhesion and low film thickness—have been largely overcome. Amercoat 86 Primer stopped adhesion troubles, eliminated underfilm corrosion and undercutting, and simplified surface preparation. *Now Amercoat 33HB Topcoat builds thick films in fewer coats at surprising savings.*

Amercoat 33HB is a "high-build" version of Amercoat 33, the standard of the protective coatings industry for over ten years. 33HB gives you the same high resistance to corrosive chemicals, severe weathering and abrasion, *plus 33% greater thickness per coat!*

The solids content of 33HB tops all other non-mastic vinyl coatings, yet workable viscosity is retained. It applies smoothly and easily by hot or cold spray. No need to stock two types of materials.

New Lower Cost

In evaluating any coating, always look at the cost per square foot, and the number of coats required to build proper film thickness. 33HB is nearly 24% cheaper per mil square foot than traditionally low cost 33...and compared to other leading vinyls, (see chart) savings are even greater. For example, although the gallon price of Coating "C" is 46% lower than 33HB, because of its low solids content the actual *material* cost for 5 mils thickness is almost 30% higher than 33HB, and the applied cost, (labor and material) is almost 90% higher.

For the full story, send coupon for data on 33HB and detailed cost comparison of the four coatings on the chart.

Amercoat® CORPORATION
4809 Firestone Blvd. · South Gate, Calif.

AMERCOAT Corp. Dept. L4
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South Gate, Calif.
Please send me full information on Amercoat 33HB

Name_____
Title_____
Company_____
Address_____
City_____ Zone____ State_____

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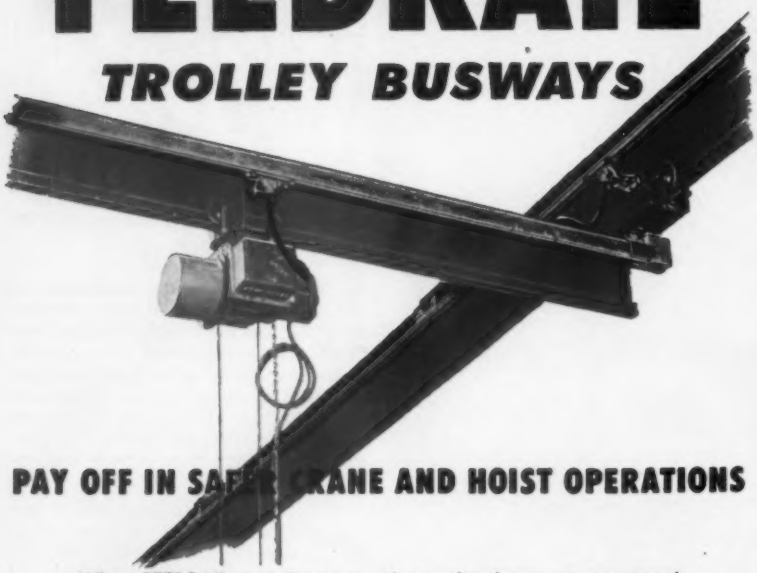
FEEDRAIL®

TROLLEY BUSWAYS



PAY OFF IN SAFE CRANE AND HOIST OPERATIONS

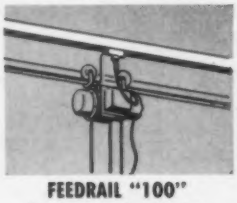
When FEEDRAIL goes into your plant—the danger to personnel and equipment from exposed wiring goes out.

With its sliding contacts and its current-carrying copper bus bars enclosed in a sturdy steel housing every inch of the way, FEEDRAIL comes as close to giving you *100% safe crane and hoist electrification* as you can get. There's no chance of frayed, sagging or broken wiring — there's no danger of accidental contact with exposed conductors—and there are no long cables trailing in aisles and work areas.

The result—fewer electrical accidents—faster, more efficient materials handling—safer and less frequent maintenance—and lower insurance rates as a result of improved safety records and the elimination of hazardous working conditions.

What's this mean to you? Simply that the savings you'll make will quickly repay the cost of your FEEDRAIL installation.

FEEDRAIL "60"
for budget hoists



FEEDRAIL "100"
for heavy duty hoists and light tonnage cranes

FEEDRAIL "HEAVY DUTY"
for big tonnage cranes and hoists

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☐ Test Lines ☐ Other Applications (please specify)

Name Title

Firm

Address

City State P-4

For more facts circle 629 on Reply Card

NEW PRODUCTS

(Begins on page 168)

turbine develops a counter-head to stop fluid circulation at high speed ratios. Besides simplifying construction, this is claimed to eliminate a source of possible field failure. Another design feature is that impellers having different bladings (both number of blades and pitch) are interchangeable. It is noted that Series 1300 Converters can be matched as accurately as possible to engines of various hp outputs and speeds within rated limits, without requiring changes in the converter housing or other components. Present production of the 1300 Series consists of one model—the Model F, a spacer-type arrangement with SAE No. 2 engine flywheel housing size and SAE No. 2 or 3 output housing. Twin Disc Clutch Co.

63—POWER SANDER is light in weight, low in cost

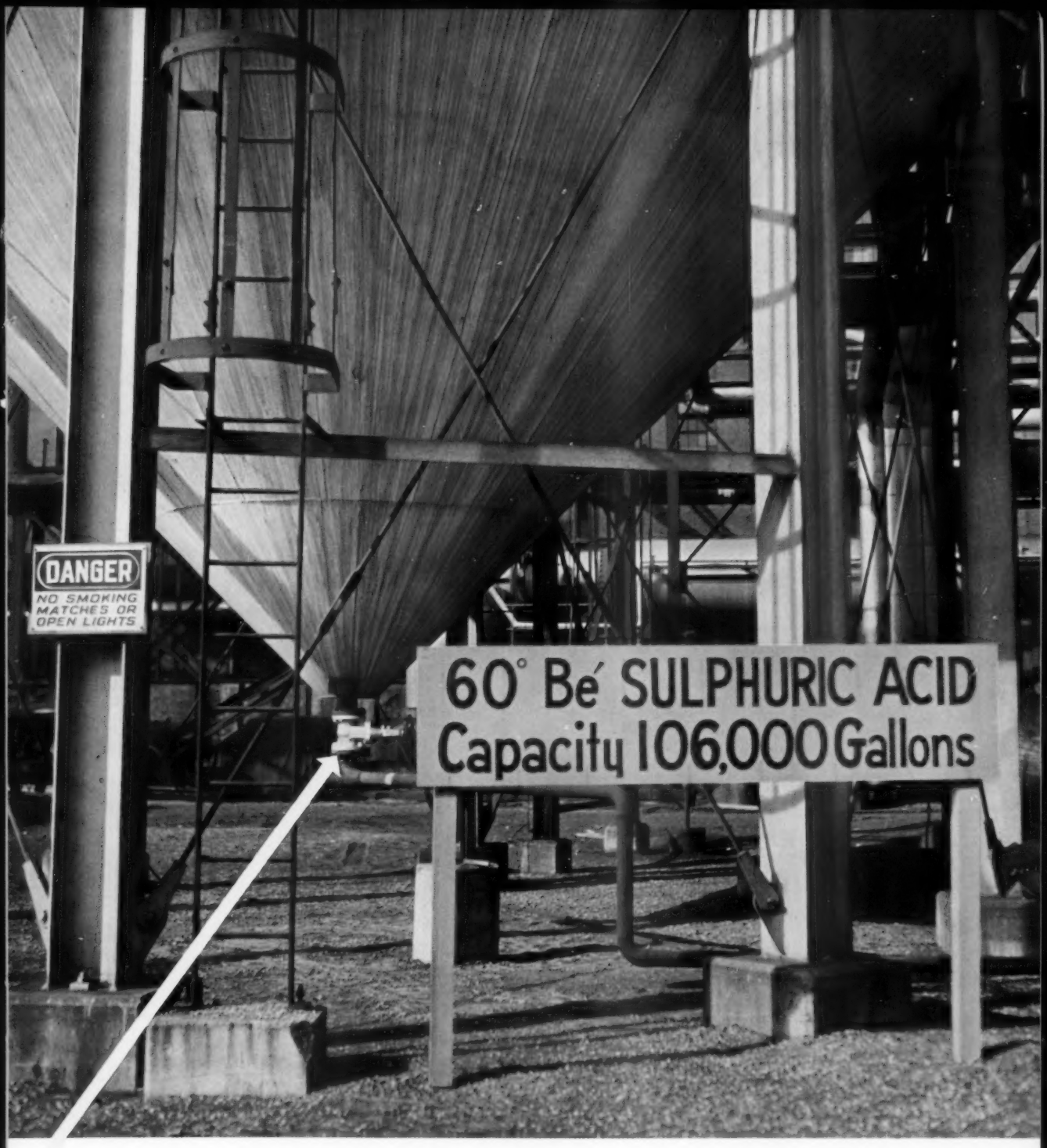
The No. 16 SpeedSander, weighing only 5 lb and costing about $40, is offered for use where fast volume turnout is desired. Powered by a universal series wound motor for a-c or d-c operation, the sander delivers 6200 rpm.

Because of its light weight this tool is declared particularly suitable for overhead work, such as on ceilings and under eaves. An all-ball bearing tool, it has ventilating slots that draw air through the motor for cool running operation. Sanding area of this tool is 4½ by 5⅛ in. It is 9½ in. long overall and has a 10-ft lead cord. It also comes in kit form. Speedway Mfg. Co., Div., Thor Power Tool Co.

64—DRAFT INDUCER designed for small heating plants

Model 10-D Draft Inducers are designed for use in smaller heating plants, with capacities to 4½ gal of oil or 500 cf of 1000 Btu gas per hour. It is said to provide adequate draft at all times regardless of wind or weather, assure better combustion and lower fuel consumption, eliminate need for tall stacks. It may be mounted horizontally or vertically in the breeching. A feature of the draft inducer is the fact that motor and fan assembly are in one unit, easily withdrawn from casing for inspection or servicing. Company points out that the

For more facts circle 630 on Reply Card ⟶



Small valve takes on big job at U.S. Steel

That's a 4" Aloyco Gate Valve of Aloyco 20 stainless steel guarding the outlet of one of the largest acid tanks ever built.

It's one of the new units erected as part of United States Steel's modernization of the Coke and Coal Chemical Division facilities at Gary, Indiana. Aloyco valves are widely used here in both the Otto Construction Corporation's ammonium sulfate saturators and in the solvent recovery units which were engineered by United Engineers & Constructors, Inc.

They're also widely used by other leading manufacturers in the chemical processing and petroleum industries. Perhaps Aloyco valves could save you money in handling corrosives. Want more information? Write Alloy Steel Products Company, Inc., 1301 West Elizabeth Ave., Linden, New Jersey.

6.27

GARDNER-DENVER

tools

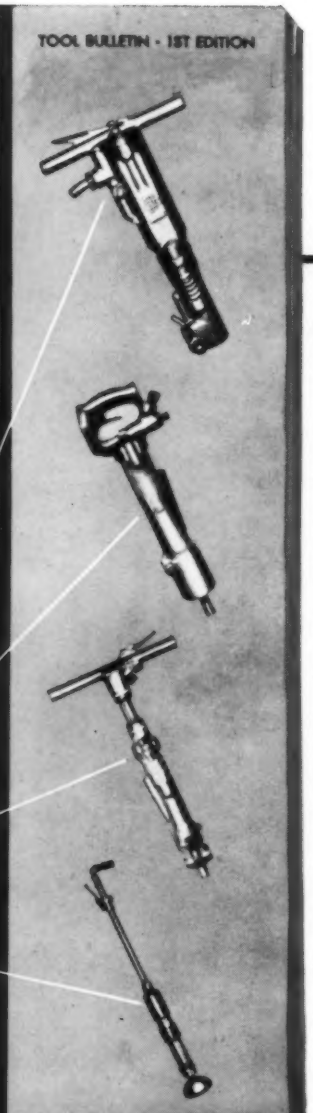
for

PAVING BREAKERS

CLAY SPADERS

TRENCH DIGGERS

BACKFILL TAMPERS



CONTENTS

Wedge Points
Moil Points
Chisels
Digging Chisels
Asphalt Cutters
Axes
Spades
Frost Wedges
Concrete Busters
Sheeting Driver Shanks
Tamper Shanks
Sheeting Driver Shoes
Tamper Pads
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Instructions

NEW TOOL BULLETIN

...yours for the asking

Gardner-Denver demolition and maintenance tools are *shot-peened* to stand up under hard use. Many operators report 3 times normal service life. Gardner-Denver provides world-wide service from 50 branch offices, 9 plants. Send for your copy of our new Tool Bulletin.

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Another first to help widen the scope of welding

Opens up new standards of speed and economy in welding mild steel

Here's the first all-position class 6010 electrode ever made with an iron powder coating. X-Ray and physical properties of the new Easyarc 10 are excellent. Outstanding characteristics for all-position welding with the inherent advantages of an iron powder coating. For a free sample of the new Easyarc 10, contact your nearest Airco Office.

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AT THE FRONTIERS OF welding PROGRESS YOU'LL FIND . . .

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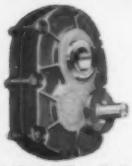
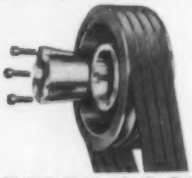
DODGE PRODUCTS you should know



TORQUE-ARM
SPEED REDUCERS
Cost less—deliver more!



TAPER-LOCK
SHEAVES
Easy on—easy off! Mount flush!

TAPER-LOCK
SPROCKETS
No reboring—no waiting!

●

Write for Bulletins!

- Torque-Arm Speed Reducers. 15 sizes—1 to 100 hp. Bulletin A-637
- Taper-Lock Sheaves. Drive tables and technical data. Bulletin A-661
- Taper-Lock Sprocket and Dodge Roller Chain data. Bulletin A-644

DODGE MANUFACTURING CORPORATION
2700 Union Street • Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

For more facts circle 633 on Reply Card

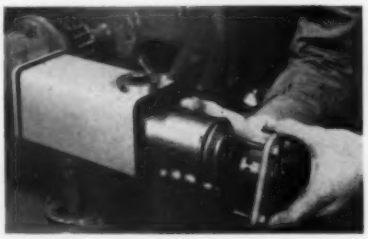
NEW PRODUCTS

(Begins on page 168)

bearings are air cooled, fan needs no lubrication, and the unit's quiet operation makes it suitable for use where low noise level is desirable. Bulletin 10-D-57 gives details. L. J. Wing Mfg. Co.

65—STRAINER UNIT shows when cleaning is needed

The Telltale Strainer is announced as a device that notifies the user when the hydraulic strainer is dirt clogged, acts as a by-pass valve (to protect pump) and provides for easy strainer removal. Use of this unit brings the strainer out



of the depths of the reservoir to any convenient outside location, where it can be seen and serviced easily. A red signal indicates when the strainer is clogged and has been pulled aside by pump suction to allow the free flow of oil around it. Automated setups can use an optional limit switch for a remote signal light. It is noted that the strainer is easily removed, as it is held in place only by the bolted-on plate. Manufacturer says the usable oil supply is increased up to 20 per cent when this unit is installed because the oil inlet pipe (not carrying the strainer) can be lowered farther into the tank. A manifold may be had to mount dual units. The Rosaen Co.

66—HAND TRUCKS made of light weight magnesium

Weight Savers are all-magnesium hand trucks. They carry up to 450 lb, weigh as little as 16 lb. Manufacturer says they outlast conventional types, are rust-proof and break-proof. They roll on 6-in. or 8-in. ball bearing wheels and have semi-pneumatic balloon tires. Four models are offered. The Colson Corp.

67—HOSE ASSEMBLIES of increased flexibility

Flex-O-Tube Teflon Hose Assemblies are constructed of smooth extruded Teflon tube with stainless steel wire braided covering. This hose is designed for working pressures to 3000 psi under certain temperature conditions, and temperatures to 500 F when working pressures are not above 1000 psi. The high tensile strength of the assemblies permits smaller outside diameter than many hose materials, effecting savings in weight and space. This characteristic also serves to provide resistance to vibration and to protect against fatigue failures. Conventional straight and elbow fittings and special shapes are available on the hose assemblies—in aluminum alloy lower temperatures and in cadmium plated steel or corrosion resistant stainless steel for high temperature, high pressure use. Operating and shelf life of the hose are declared practically unlimited. It comes in sizes $\frac{3}{16}$ to $1\frac{1}{8}$ in. Flexonics Corp.

68—I-BEAM TROLLEYS in 3- to 10-ton capacities

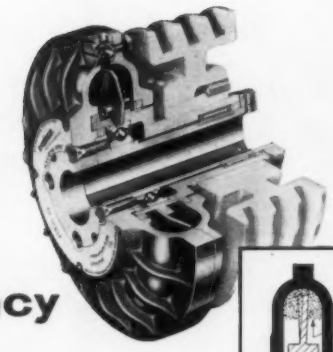
Budgit Hi-Cap Trolleys include both the push type and the hand geared type. Both have life lubricated bearings throughout, it is stated, and under normal usage rarely require repairs and maintenance. A feature announced is the use of forged alloy steel wheels with flame hardened crowned treads. Flame hardening helps reduce tread wear, while tread crowning contributes to easy rolling characteristics. Crowning also lets trolleys work equally well on all I-beam flange tapers from 0 through 15 deg, manufacturer notes. (Standard flange taper is 9 deg.) All capacities are adaptable to a wide range of I-beam sizes by rearrangement of spacer washers on the cross shaft. The hand geared Hi-Cap Trolley is identical to the push type except for the gearing, hand chain wheel, hand chain and guide. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

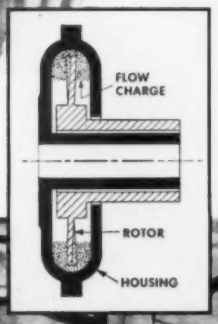
69—DISPENSING UNIT serves a complete meal

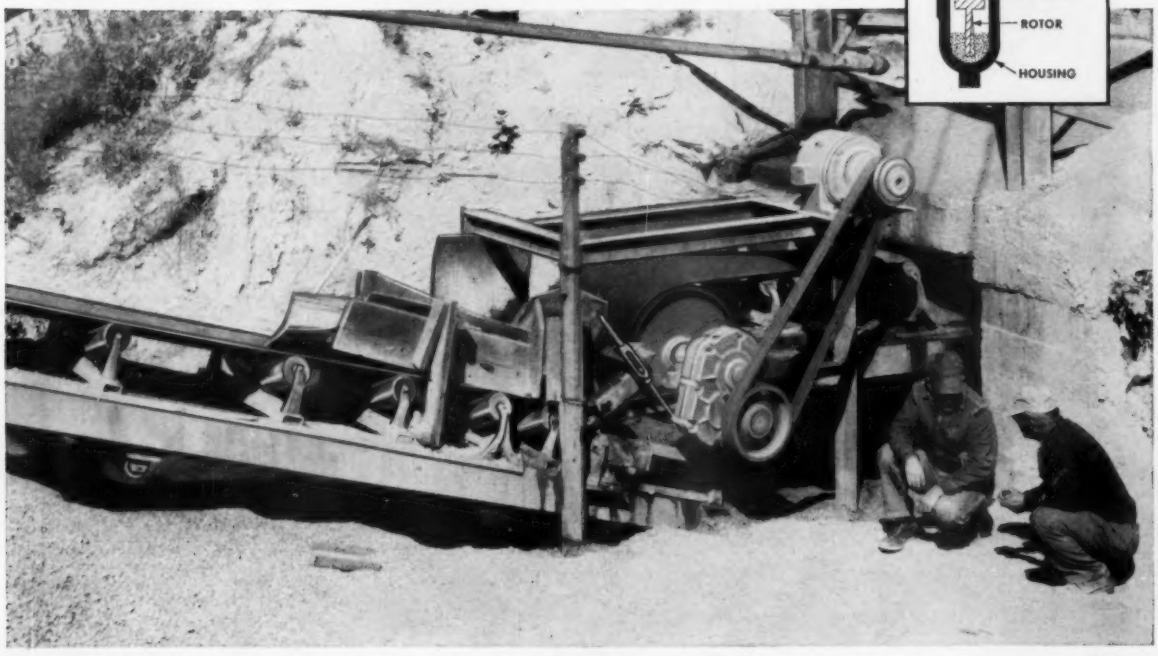
Kwik-Kafeteria is designed to serve a full meal from appetizer to dessert in seconds. It serves juices, soups, meat pies, salads, spaghetti, pastries, coffee and other foods by pressing a button. The modular battery consists of a hot plate vendor, a hot can machine, and a sandwich-pastry unit. The units have the same dimensions and appearance, so that when placed side-by-side, they look like a single unit.

The hot lunch or dinner unit has two selections, with a capacity of 22 packages. Commodities weighing from 4 to 16 oz, packed in aluminum foil containers with tear-off cover, can be vended. Pre-cooked foods are held

This new drive starts loads smoothly... with smaller motors ...and gives 100% efficiency at full load!







FLEXIDYNE

THE DRY FLUID DRIVE

This tunnel conveyor, 225 feet long, handles 500 tons of sand and gravel per hour—8 to 16 hours a day.

With Flexidyne, the motor picks up the load easily and smoothly. Power investment is reduced, power costs cut, maintenance simplified and conveyor belts are protected against breakage.

Flexidyne, the Dry Fluid Drive, is the *new* development that starts loads smoothly, that protects against shocks and overloads, that saves power and that gives 100% efficiency at full load!

The "dry fluid" in Flexidyne is heat treated steel shot. A measured amount, called the flow charge, is contained in the housing, which is keyed to the motor shaft. When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, wedging it between the housing and the rotor which transmits power to the load.

After a momentary slip between housing and rotor, the two become locked together and achieve full load speed without slip and at 100% efficiency during the running cycle. Changes in weather—hot or cold—inside or out—do not affect operation of Flexidyne.

Flexidyne is now available in 8 sizes—for use with electric motors and internal combustion engines from 1 hp to 300 hp. While each size is power rated, the flow charge can be varied at will to give tailor-made torque for your particular job. Write for Bulletin A-640.

DODGE MANUFACTURING CORPORATION
2700 Union Street, Mishawaka, Indiana

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in in your classified phone book, or write us.

DODGE
of Mishawaka, Ind.

For more facts circle 634 on Reply Card

Ever try driving a nail into concrete? Now you can do it easily, with SHURE-SET, the new tool that guides fasteners into mortar, concrete—even steel!

Simple, easy and inexpensive—the SHURE-SET tool uses no outside power—just makes your hammer power more effective. This tool holds and directs fasteners with pin-point accuracy—ends pre-drilling, star drilling, filling, plugging and chipping. Saves time, money and effort.

There's no bend, bounce or buckle with SHURE-SET. Pins and studs go in where you want them. Ends the frustration, uncertainty and waste of other methods.

SHURE-SET by the makers of Ramset® —gives you a real advantage over old-style methods. Get the jump on your competition. Ask your supplier, or write now for full details.

COMPLETE KIT contains everything you need.

Shure-Set Trademark
HAMMER-IN FASTENING TOOLS
PATENTS PENDING
BY THE MAKERS OF Ramset® PRODUCTS

Ramset Fastening System
WINCHESTER-WESTERN DIVISION
OLIN MATHIESON CHEMICAL CORPORATION

12133-D BEREA ROAD • CLEVELAND 11, OHIO
For more facts circle 635 on Reply Card

NEW PRODUCTS

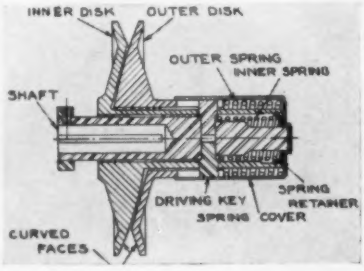
(Begins on page 168)

from 32 to 40 F until meal time—then they are heated to pre-set temperature. Hot temperatures are maintained during meal times, with unsold foods returned to refrigeration temperature at end of period. Each column can vend at a separate price. The hot canned food machine offers four selections, has a capacity of 104 cans. The sandwich, or pastry vendor holds 50 products. Rudd-Melikian, Inc.

Use the Reader Service Cards provided on pages 247-248 to ask for more information on these products. Circle item numbers of products in which you are interested.

70—V-S PULLEYS require almost no maintenance

Models 175 and 180 are announced as low-cost variable speed pulleys with a speed ratio of 2½ to 1 and are said to be practically maintenance-free, having no intricate parts. Oil-impregnated



bushings eliminate lubrication. According to company, units are easily installed on old or new equipment and are especially recommended for simplified installation where speed changes are required to instantly compensate for variations in production schedules or differences in ability of operators. They use a standard B section V-belt. Model 175 is rated ⅔ hp at 1150 rpm and 1 hp at 1750 rpm; Model 180 is rated 1 hp at 1150 rpm, and 1½ hp at 1750 rpm. Pitch diameter is 5.93 in. and length of bore is 2¾ in. Lovejoy Flexible Coupling Co.

71—IMPACT WRENCH is manually operated tool

According to manufacturer, the Swench can deliver torque values up to 20 times that applied to handle—letting a single operator hand-tighten to practical tensions bolts up to 1¼ in. diam. It is noted that as impact force can be controlled through a spring-setting, any desired bolt tension can be produced by the operator through control of the impact force and number of im-

GIANT-SIZE PROTECTION

Cranes, conveyors, bridges, storage tanks—the giants of industry can be protected economically with Barrett Cold Coatings. These high-grade coal-tar coatings offer outstanding resistance to moisture and chemical atmospheres. Their long service life and low applied cost per coat thickness can net a substantial reduction in plant maintenance cost. They can be applied quickly and simply by brush or spray to metal, masonry and wood surfaces. No heating or activation required. No special techniques or skills needed by applicators . . . priced for economy.

You get peak protection at lowest cost with Barrett Cold Coatings. Barrett will be glad to show you how. Write for particulars, prices, literature.

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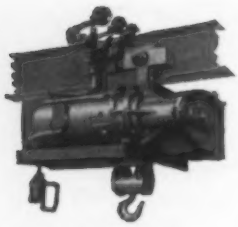
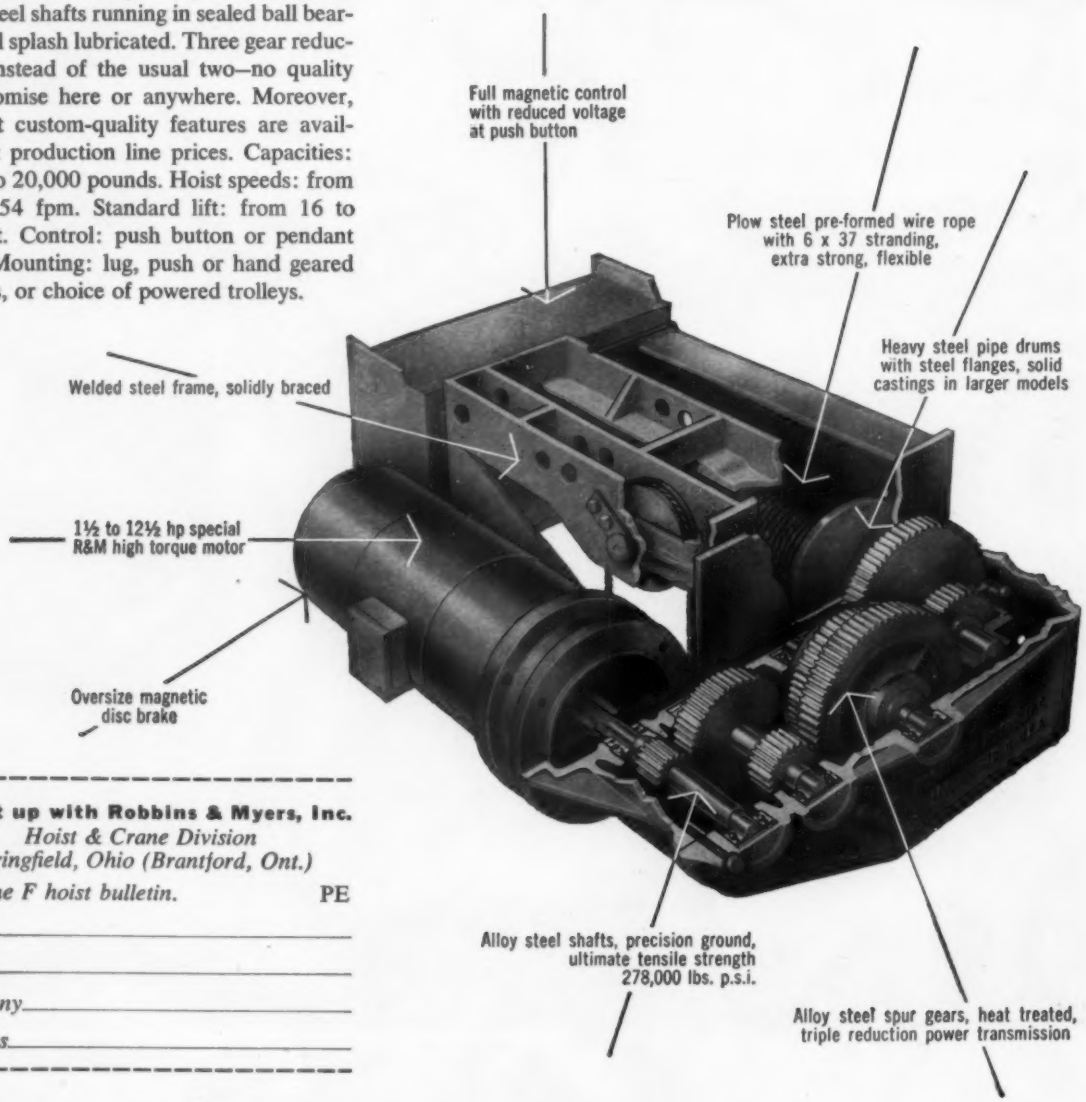
OVER 100 YEARS OF EXPERIENCE

For more facts circle 636 on Reply Card



choose a hoist with extra stamina

F hoists cut down the cost of lifting but the F hoists save still more money. Dollars usually spent on maintenance become dollars earned because of the extra stamina built into each component. Look at the gearing—here are precision cut alloy steel spur gears, wide faced and heat treated for durability. They're mounted on alloy steel shafts running in sealed ball bearings, all splash lubricated. Three gear reductions instead of the usual two—no quality compromise here or anywhere. Moreover, F hoist custom-quality features are available at production line prices. Capacities: 1000 to 20,000 pounds. Hoist speeds: from 10 to 54 fpm. Standard lift: from 16 to 40 feet. Control: push button or pendant rope. Mounting: lug, push or hand geared trolleys, or choice of powered trolleys.


Full magnetic control with reduced voltage at push button
Plow steel pre-formed wire rope with 6 x 37 stranding, extra strong, flexible
Heavy steel pipe drums with steel flanges, solid castings in larger models
Welded steel frame, solidly braced
1½ to 12½ hp special R&M high torque motor
Oversize magnetic disc brake
Alloy steel shafts, precision ground, ultimate tensile strength 278,000 lbs. p.s.i.
Alloy steel spur gears, heat treated, triple reduction power transmission

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Send me F hoist bulletin. PE

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ROBBINS & MYERS **hoists • cranes • winches**

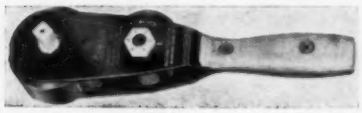
For more facts circle 637 on Reply Card

NEW PRODUCTS

(Begins on page 168)

pacts applied to the fastening.

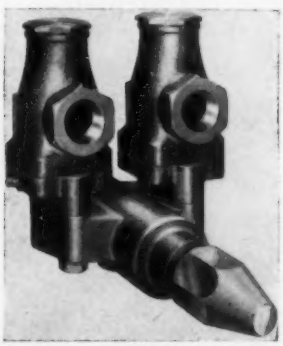
The Swench has two drive extensions, one for loosening and one for tightening fastenings, and is operated like a ratchet wrench. As the handle is pulled, a spring and rotor mechanism delivers rotary hammer blows



automatically through the socket to the fastening, at torque values up to 20 times that applied to tool handle by the operator. One impact is delivered for every 30 deg of movement of the handle. Impacts may be delivered in succession by continuous movement of handle in one direction, or singly or in short bursts, by reciprocating the handle like a ratchet wrench. Each impact produces an audible sound, so the number of impacts can be counted. The Swench comes in three models. The smallest fits ½ in. sockets, takes bolts through ¾ in., and costs around $95. Swenson Engineering Co.

72—RELIEF VALVES in pressure settings to 300 psi

These safety relief valves are available in standard pressure settings ranging from 50 to 300 psi in 25-lb increments and are announced as meeting all pertinent code requirements. They are offered for use on all types of industrial refrigerating and air conditioning installations and declared suitable for use with all popular refrigerants. They are available in dual assemblies de-



signed to assure operation of one valve while the other is removed.

Use of special construction materials is said to prevent corrosion and sticking due to "cold welding." Company says this dual relief valve is stronger, more compact and more easily assembled in the field than many safety relief valves, and that it has three times the capacity of earlier models in th same nominal inlet sizes and at most pressure settings. This increased

How molten metal helps give Galbestos its superiority

Robertson Color Galbestos has the greatest resistance to weather and corrosion of any protected steel roofing or siding obtainable anywhere. This position of broad superiority is made possible by a unique manufacturing process exclusive with H. H. Robertson Company.

First, the steel sheet is pickled . . . then given a coating of molten zinc. Asbestos felt is then pressed on so that as the molten metal hardens in cooling it grips the felt fibers in absolute bond. The asbestos is then impregnated with a special asphaltic compound and, finally, given a tough weatherproof coating. Galbestos can be furnished flat or in the 3 well-known corrugations: Standard, Mansard, and V-Beam. The resultant material is so durable, it may be sheared, bent, rolled, crimped and riveted in the field as easily as ordinary unprotected steel. It will withstand the greatest possible extremes in weather temperatures without deterioration, and will actually retard fire better than naked steel. For an industrial roofing or siding that requires no maintenance under the most severe corrosive conditions, specify Color Galbestos.

Long Service Life. Color Galbestos will give longer maintenance-free service under the most severe weather and man-made corrosive conditions. Even salt air cannot penetrate its tough coatings to destroy the steel core.

Not Fragile. Color Galbestos' strong steel core sheet guarantees against breakage—during shipment or during erection.

Resists Climatic Extremes. Color Galbestos is not subject to damage either by tropic or frigid temperatures. Its coatings will not run under broiling sun or crack or spall in sub-zero weather.

Goes Up Fast. The exclusive Robertson Top-Speed method of attaching Color Galbestos to structural steel speeds up erection for quicker occupancy.

Resists Flame. Leading testing laboratories have made exhaustive tests on the fire resistance of Galbestos and have published the results. Copies of these reports are available for study.

NOW AVAILABLE IN SIX USEFUL COLORS FOR ROOFS AND SIDEWALLS

Robertson Color Galbestos

a product of H. H. Robertson Company
2419 Farmers Bank Building • Pittsburgh 22, Pa.
In Canada: Robertson-Irwin Ltd., Hamilton, Ontario
In England: Robertson Thain Ltd., Ellesmere Port, Cheshire

For more facts circle 638 on Reply Card →

Ford Foundry uses JOY LIMBEROLLER Belt Conveyor Idlers

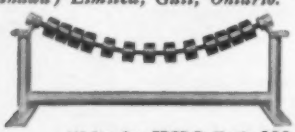
Joy Limberollers at work on a belt conveyor at Ford's Cleveland Foundry.

This radical, new idler is used in handling abrasive foundry sands at Ford's Cleveland Foundry. Each idler is a single roller consisting of a series of pressure-molded neoprene or rubber discs on a flexible steel cable. Only two bearings are used and these are up out of the dirt zone.

Joy's new belt conveyor idler has already given over *twelve times* the service life of conventional idlers in handling many difficult materials . . . abrasive foundry sands, coal, petroleum coke, potash, copper ores, mill tailings iron ore, wet concrete, triple superphosphate, ammonium sulphate and sticky fertilizers.

The Limberoller is unaffected by most corrosives that damage steel . . . is ideal for chemical, sulphur and salt plants.

Get details from *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*



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Consult a Joy Engineer

For Air and Gas Compressors, Vacuum Pumps and Boosters, Conveyors, Fans, Electrical Connectors

WBW-16336-133

JOY

Since 1851 . . . Over 100 Years of Engineering Leadership

For more facts circle 639 on Reply Card

NEW PRODUCTS

(Begins on page 168)

capacity enables the available inlet sizes in this new safety relief valve line (½ to 1¼ in.) to replace valves of larger inlet sizes. York Corp.

73—HAND TOOL offers super pipe crimping power

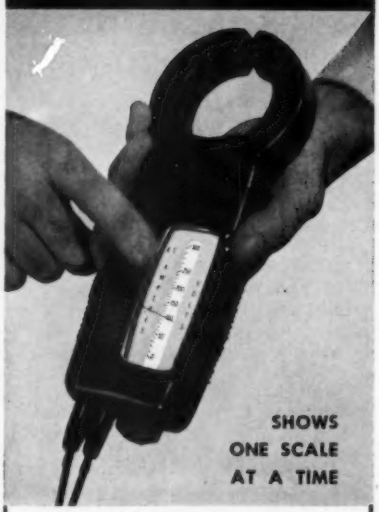
Rugged and lightweight, the Model 500 Compound Leverage Pipe Crimper is designed to multiply hand pressure to provide amazing crimping power with minimum effort. With capacity to 20-gage

galvanized steel, this handy tool makes it easier to reduce the diameter of sheet metal pipe, manufacturer states. Featuring 1¼-in. blades, two crimps are made each time the jaws are compressed. The pliable vinyl hand grips with stop posts, serve to prevent hand slippage and provide finger clearance when working against a bench. Made of abrasion resistant steel, the crimper is parco-lubrized to protect it against corrosion. It weighs about 1 lb. Bulletin 78 B Supplement gives more details on the crimper. Niagara Machine & Tool Works.

74—DEGREASER for cleaning hard to reach equipment

Grease, oil, carbon, tar, gums, and similar difficult to remove substances can be quickly and safely removed, it is announced, with Zipp—an aerosol degreaser for use on machinery and electrical equipment. Simply spray area to be cleaned, company says, and within a minute you can either wipe the object clean with a rag, or, if not electrical, hold it under a water faucet and rinse it off. Zipp will also remove greasy stains from painted surfaces, and concrete floors, company says, and will dry rapidly, leav-

G-E Hook-on Volt-Ammeter Helps Avoid Reading Errors



RANGE AND SCALE of this G-E instrument show simultaneously by simply turning the fingertip control knob. Seeing only one range and scale avoids reading errors.

SCREW-IN VOLTAGE LEADS and recessed terminals provide maximum protection for the operator. Voltage leads cannot be pulled out accidentally.

WIDE RANGES ARE AVAILABLE in both models of the G-E hook-on volt-ammeter. Ranges of the AK-4 model are 0-10/30/100/300/800 amperes and 0-150/300/750 volts. The AK-5 ranges are 0-5/20/80/-350 amperes and 0-150/300/750 volts. The wider range AK-4 model has a pointer-stop for accurate checking of surge readings.

FOR FURTHER INFORMATION, write Section 582-20, General Electric Co., Schenectady 5, New York and ask for bulletin GEA-6292, or contact your nearest G-E Apparatus Sales Office or Distributor.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 640 on Reply Card

Now...Local Availability on

Titeflex Flexible Metal Hose

for conveying "Problem" Liquids and Gases!

Titeflex Hose solves scores of problems in conveying organic and volatile liquids as well as corrosive gases. Connects moving and/or misaligned machine parts, other terminal joints. Withstands high extremes in temperature, pressure. Absorbs vibration, shock, and flexing . . . with ease. Sizes 3/16" to 3" Other tough conveyance problems are solved with Titeflex flexible hose made of TEFLON* in sizes of 1/4" to 1 1/4".

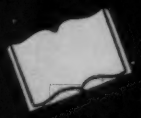
Titeflex Quick-Seal Couplings

—the ideal "connecting mate" for Titeflex Hose or *any other kind of quality hose.* Connects or disconnects in ONE second and . . . the higher the pressure the tighter the seal!

Both these time-tested products are available for immediate shipment from distributors' stocks in most areas. Otherwise write, wire, or telephone direct.

*Du Pont trademark for its tetrafluoroethylene resin

CALL YOUR LOCAL DISTRIBUTOR



Consult the yellow pages of your telephone directory

Your one source for both Hose and Couplings

Titeflex

TITEFLEX, INC., 536 HENDEE STREET, SPRINGFIELD 4, MASS.

For more facts circle 641 on Reply Card

NEW PRODUCTS

(Begins on page 168)

ing no film or vapor. It is claimed not to short electrical equipment, to be non-corrosive and non-flammable. Stewart-Hall Chemical Corp.

75—PLASTIC GOGGLES are lightweight, durable

Made of flexible plastic, CESCO No. 565 Goggles are described as extremely light in weight and durable. They are designed to provide comfortable protection to workers exposed to dust and liquid

splash. The goggles are molded from soft vinyl material. They are perfectly contoured and fit snugly all around, company says, and will fit over most personal glasses. Wide window lenses are curved to allow full vision. Small perforations, angled from the eyes, are designed to give adequate ventilation. They are available in two lens styles—clear or green plastic. Chicago Eye Shield Co.

76—PIPE FITTINGS designed to avoid leakage

Uscoweld Fittings have a paper-thin layer of plastic on a section of the inside wall. They promise to do away with leakage at joints in cemented, or solvent-welded plastic pipe installations, says manufacturer. The plastic layer makes the inner half of the fitting slightly smaller than the outside diameter of the pipe it is used to join. A light coat of solvent base cement on the inside of the fitting, and on the pipe end, softens the plastic layer

so the pipe can be pushed snugly into place. High contact pressure between pipe and fitting causes a positive weld, according to company. The weld is declared strong enough within seconds for ordinary handling, and the solvent-softened plastic in the weld area completely hardened in 2 hr—with the joint as strong as the pipe itself.

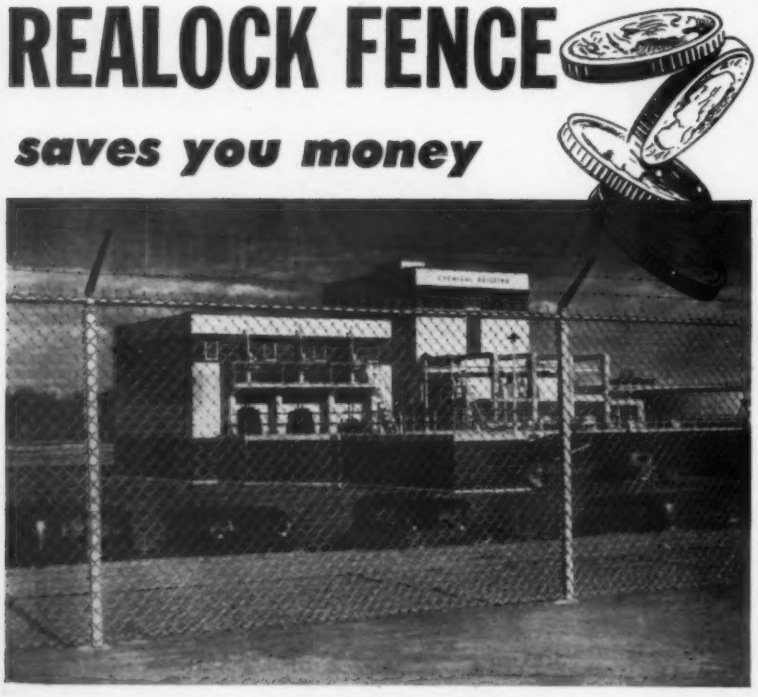
The fitting has a flared entrance, so pipe can be inserted easily, and this flared opening also aligns the pipe for welding. The fittings are made of a styrene-acrylonitrile blend, described as a tough, lightweight plastic with good corrosion resistance. Fittings for standard size pipe from ½ to 2 in. are now available. United States Rubber Co.

77—SEALING COMPOUND for curtain-wall use

Sonolastic Sealing Compound is announced as a synthetic rubber caulking and sealing compound developed for modern curtain and panel wall construction use. It is a liquid made up of sulfurized rubber polymers furnished with an activating agent which cures the liquid to a rubber-like substance after it is introduced to the joint, becoming a resilient part of the joint structure for the life of the building, company explains. Product is described as non-shrinkable and impervious to the effects of air, moisture, salt spray and sunlight, possessing the property of cold flow and complying readily with distortions of panels caused by extremes of temperatures. Company recommends the compound in construction requiring outstanding adhesion, weathering resistance, elasticity, extreme temperature ranges, oil resist-

REALOCK FENCE

saves you money



• • • Saves cost of extra guard personnel

• • • Cuts cost of ground maintenance

• • • Cuts down pilferage losses

• • • Makes possible lower insurance rates

• • • Guards against loss from burglary and vandalism.

Consult your classified telephone directory for nearest sales office or write to any of our three division offices for free estimate or catalogue.

THE COLORADO FUEL AND IRON CORPORATION—Denver and Oakland
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BRANCHES IN ALL KEY CITIES

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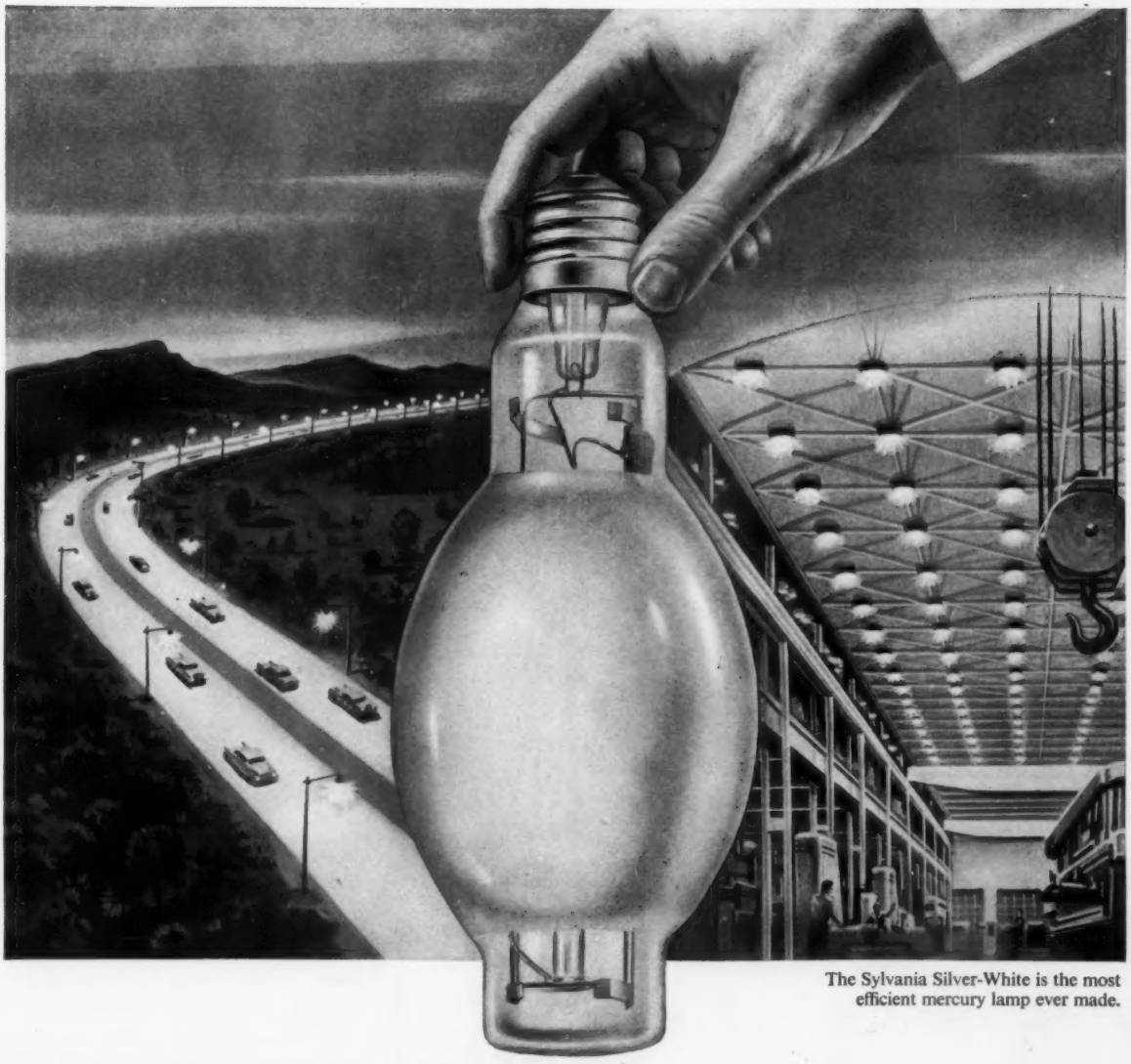
For more facts circle 642 on Reply Card



The Sylvania Silver-White is the most efficient mercury lamp ever made.

For highway . . . or high-bay

. . . the one-lamp answer to both lighting needs

Today's most efficient mercury-vapor lamp is the new Sylvania Silver-White.

The greater light output and superior color quality of the Silver-White makes it an effective, versatile lighting source . . . it serves the high requirements for such widely different applications as highway lighting and high-bay plant illumination with unequalled efficiency.

Sylvania's Silver-White actually delivers up to 33% more lumens of light than previous color-improved mercury-vapor lamps. The 100-watt lamps, for example, are producing an unprecedented 4000 lumens in actual installations.

Sylvania Silver-White lamps cost no more than conventional color-improved lamps—but offer the combined economies of superior light output and superior construction.

Silver-White lamps are available in 100-, 175-, 400-, 700-, and 1000-watt types to meet the needs of industry for efficient high-bay indoor lighting and outdoor illumination for parking and loading areas . . . and for the governmental requirements for effective highway lighting.

For complete information about the Sylvania Silver-White Mercury Vapor lamp, call your local representative, or write:

SYLVANIA ELECTRIC PRODUCTS INC.
Lighting Division, Dept. 7L-7004
60 Boston St., Salem, Mass.
In Canada: Sylvania Electric (Canada) Ltd.
Shell Tower Building, Montreal

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LIGHTING • RADIO • ELECTRONICS • TELEVISION • ATOMIC ENERGY

For more facts circle 643 on Reply Card

NEW PRODUCTS

(Begins on page 168)

ance and durability. It is said to work equally well for metal, glass and concrete, and be usable in many types of tanks, boxes and screens as a filler or gasket. It comes in 10 and 2½ lb units, comprised of both base and activator, in neutral tan, black, aluminum and gray. L. Sonneborn Sons, Inc.

78—FLOOR WAX gives glossy, anti-slip finish

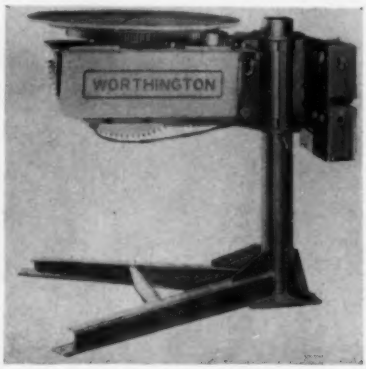
Announced as completely reformulated is Westwax, a water emulsion product for all surfaces. It is formulated with a refined grade of light-colored Carnauba wax which, manufacturer claims, permits use on light colored or even white floors without discoloration. The wax also contains Mirite®, company's emulsion of a hard, clear, glossy plastic which gives the wax its durability, and Ludox, which adds to its anti-slip properties. Westwax is UL listed as an anti-slip floor maintenance material, it is noted. Manufacturer says that it provides a high initial gloss without buffing, is scuff-resistant and water-resistant, yet readily removed when desired. It may be damp mopped and buffed repeatedly as a means of economical maintenance, company notes. West Disinfecting Co.

For more facts circle 644 on Reply Card

Reader Service Cards on pages 247-248 make it easy to get further information on any of these products. Just circle the item numbers of the products you would like to know more about.

79—WELDING POSITIONER for light weldments

Model 10P Welding Positioner, designed for automatic welding requiring close speed regulation, has a load capacity of 1000 lb at 4 in. eccentricity and 4 in. center of gravity. The round table has

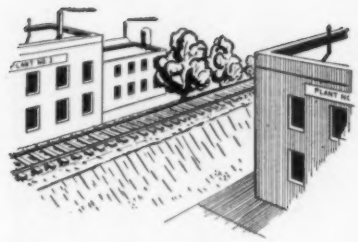


a diameter of 29 in. with four radial T slots. Designed for accurate handling of lightweight weldments for manual and automatic welding operations, Model 10P is driven by a ⅓-hp Servospeed electronic variable speed drive which includes dynamic braking and jogging and has a speed regulation of 2 per cent of set speed. Positioner has a height adjustment from 27 to 42 in., available by manual or motor operated elevation. Controls are at remote pendant station, with voltage at operator's level stepped down to 110 v for safety. Worthington Corp.

80—CONTROL PILOT for the diaphragm valves

The No. 811 and 811-R (reverse acting) are for use with diaphragm actuated regulating valves. The pilot is designed to respond to small variations in controlled pressures in the flow line, and readjust the main regulator for precise throttling of the steam, gas, or liquid flow. Company says it accurately positions diaphragm control valves used either as reducing or unloading valves.

According to manufacturer, this pilot is a positive mechanical device developed to eliminate leak-off of hydraulic fluid while still retaining sensitive control of the diaphragm control valve. It consists basically of a two-way valve actuated by a diaphragm opposed by a loading spring. The adjustable pressure range is broad and settings are readily adjusted, it is pointed out. Controlled pressure ranges are 3-15 psi, 10-40 psi



Want to Cross the Tracks...or Street? Armco Can Help You Get There Quickly

Expanding businesses often find their facilities are separated by busy railroad tracks, streets or structures. Utility lines, water supply and sewage systems frequently need to be joined. In addition, plant vehicles and personnel may require ready access to separate facilities. Even production lines may have to be linked across a street or track.

Armco can help you do these jobs—quickly and at low cost—with underground Armco Structures. Here's how.

Tunnel Under Highway Joins Loading Dock and Plant

A busy four-lane highway separated a seed company from its railroad loading dock. A 90-inch-diameter Armco MULTI-PLATE® Pipe, 198 feet long, was installed as a conveyor tube under the highway. Now handling of seed is safe and efficient. And the conduit is durable and easy to maintain.

Plant Jumps Track; Tunnel Joins It

A plant expansion program by a Florida food processor was complicated by the location of railroad tracks. Production areas were separated from new storage areas until a tunnel of Armco Liner Plate was pushed under the tracks. Tunneling saves the surface. There's no interruption to traffic and no costly repairs.

There is an Armco Corrugated Metal Structure for practically every drainage, conduit or tunnel need. Write us for data. We'll be glad to work with you to find the lasting, economical solution.

Armco Drainage & Metal Products, Inc., 4257 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. In Canada: write Guelph, Ontario. Export: The Armco International Corporation.

ARMCO CORRUGATED METAL STRUCTURES

ARMCO®

For more facts circle 645 on Reply Card

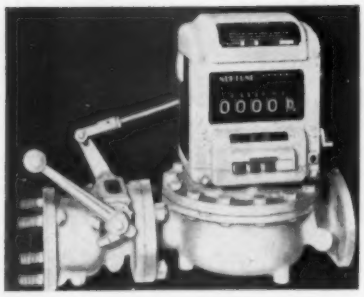
NEW PRODUCTS

(Begins on page 168)

and 25-100 psi. A minimum operating pressure of 30 psi is required. The valve has gages for inlet hydraulic and load line pressures. Atlas Valve Co.

81—LIQUID METER remembers the batch size

Equipped with a "memory," this repeating auto-stop liquid batching meter is designed to deliver the same quantity of liquid each time the valve is opened—



shutting off automatically when the preset quantity is reached. The quantity setting is changed by pressing buttons on the register. This meter is suggested for production batching and blending operations where the same formula is repeated over and over again. First of several advantages cited for the instrument is better quality control. The chance of human error is less because the auto-stop quantity setting is made only once, regardless of the number of times any set quantity is delivered. And, the large numerals provide visual confirmation. A ticket-printing feature can also be included. Less operator time is required. It is noted that when a batch size or formula is changed, only seconds are required to reset the register.

An emergency button is provided to stop flow at any point. Then, delivery can be finished to the original quantity by re-opening the valve; delivery can be finished to a different quantity by manual operation of the valve; or if necessary, a new batch may be started with the same quantity by first turning the re-cycling knob. The register also includes totalizer numerals. Neptune Meter Co.

82—DENTAL TOOLS work all around the plant

These stainless steel fugitives from a dental office are reported to perform jobs that defy most tools. Where assemblies and operations approach the miniature

or subminiature, the multiform needle ends and nonskid handles of these modified dental explorers aid in manipulating, manual sensing, guiding, selecting, assorting, and even lubricating, where tiny droplets of oil are rolled down the tine into remote bearings and joints. They're called Dentools, and a matched set of three double-headed ones costs less than $5.00. A. Lawrence Karp.

83—PVC FAN designed for corrosion-free service

Constructed to resist corrosion in moving chemically laden air or gases, this PVC fan is designed for use in chemical processing operations where coated metal fans may be affected by strong acids. All parts exposed to airstream are made of corrosion-proof, unplasticized polyvinyl chloride, including blades, scroll, wheel hub and wheel back plate. Fan will withstand corrosive effects of air borne chemicals indefinitely, it is reported, yet cost is said to be less than many coated metal and stainless steel fans. Designed for floor, platform or roof mounting, fan is available in several belt driven sizes ranging from 12- to 40-in. diam. Performance ranges from 200 to 10,000 cfm, at pressures to 6 in. s.p.

foster Lagtone

COLORED INSULATION PROTECTION

Can be cleaned with soap and water or with mineral spirits or kerosene.

Highly resistant to abrasion and outdoor weathering.

Can be applied over hard asphalt coatings and sealers without bleeding; (soft or oily asphalts may cause discoloration). Withstands fumes and occasional spillage of dilute acids, alkalies and other chemicals.

Colors other than those listed below can be made on the job by the use of Foster tinting bases or at the Foster plant on special order.

Which Color Will You Use?

Write for illustrated brochure

BENJAMIN foster COMPANY

4635 W. Girard Avenue PHILADELPHIA 31, PA.

For more facts circle 646 on Reply Card

PLANET DESIGNED TUBE HANDLING SYSTEM Floats Excess Stock

This Planet system, which was recently installed in an auto plant, automatically handles frame members from tube forming to assembly. Its outstanding feature is the stacker illustrated which provides an automatic float for tubing formed in excess of immediate production requirements. In this installation, the stacker accumulates and bands the tubes on dollies for live storage. This permits efficient use of the forming equipment at timed intervals, while supplying assembly with a steady flow of tubes.

A system of this kind would work equally well for any uniform stock, such as bars, rods or billets. Perhaps it might solve a problem in your plant. Let Planet demonstrate how it can help you. *Write or phone today — there's no obligation.*

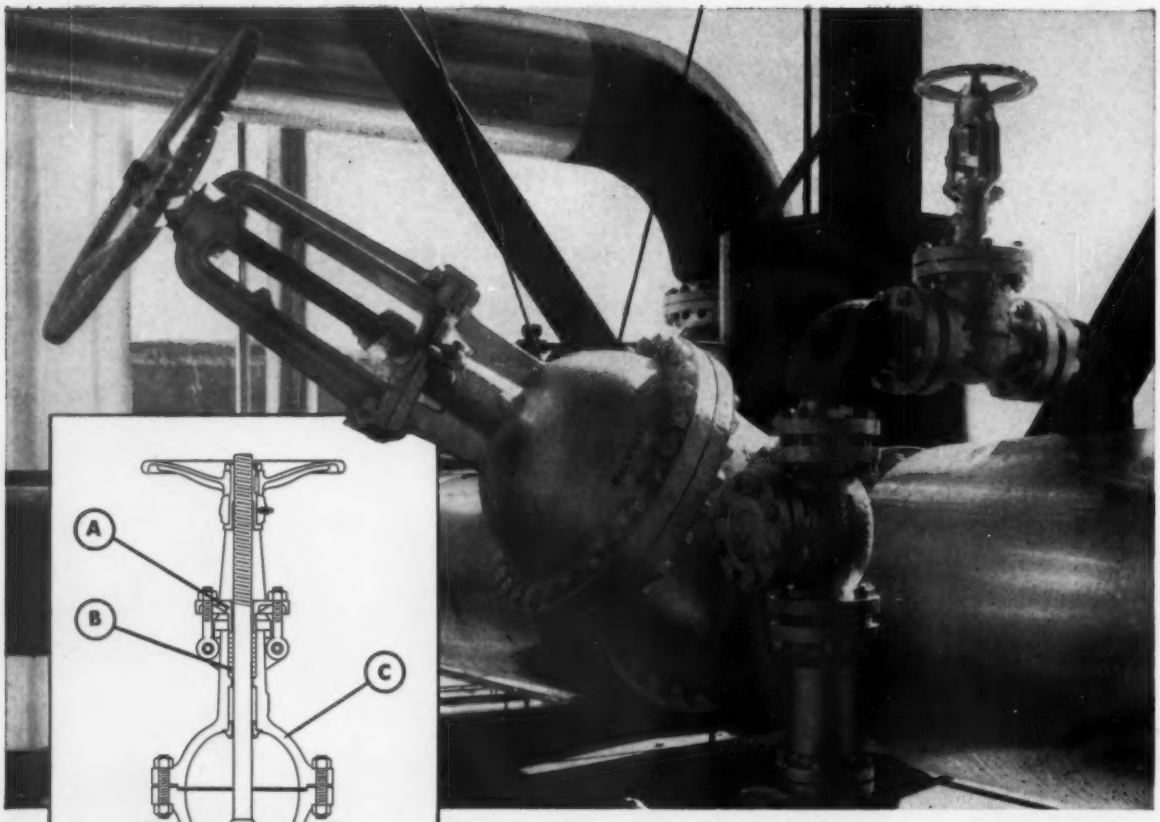
PLANET CORPORATION

- **ENGINEERED HANDLING SYSTEMS**
- **AUTOMATED EQUIPMENT**
- **FOUNDRY HANDLING SYSTEMS**

66

1840 SUNSET AVE., LANSING, MICH.

For more facts circle 647 on Reply Card



Walworth Series 150 and 300

CAST STEEL GATE VALVES OFFER YOU THESE FEATURES

for 'round-the-plant service

(A) GLANDS: Clearances between the gland and stuffing box, and gland and stem, are such that the stem cannot be scored even if the gland is pulled down unevenly.

(B) DEEP STUFFING BOXES: More than adequate in all sizes (2″ to 24″) to assure tightness and maximum packing life.

(C) BONNETS AND BODIES: Engineered to exceed the requirements of all applicable codes and standards. They are tough, durable, dependable.

(D) INTEGRAL GUIDE RIB FACES IN BODY: Machined to insure accurate centering of the gate.

(E) STURDY SEAT RINGS: Bottom-seated so that no recess exists at the back of the ring to cause turbulence, erosion and pressure drop.

(F) STREAMLINED PORTS: Permit unobstructed flow which results in minimum pressure drop and reduces the possibility of erosion.

Walworth Cast Steel Gate Valves can be furnished with either flanged ends or butt welding ends. Roller bearing yokes are available on the larger sizes. On valves 4 inches and larger, by-passes can be furnished. Walworth Cast Steel Gate, Globe and Check Valves from Series 150 to 2500, are available. For Series 600 and higher, we recommend Walworth Pressure Seal Cast Steel Valves. See your Walworth Distributor or write to Walworth for complete information.

WALWORTH

60 East 42nd Street, New York 17, New York

SUBSIDIARIES: ALOYCO ALLOY STEEL PRODUCTS CO. CONOFLOW CORPORATION M&H M & H VALVE & FITTINGS CO. SW SOUTHWEST FABRICATING & WELDING CO., INC. WALWORTH COMPANY OF CANADA, LTD.

For more facts circle 648 on Reply Card

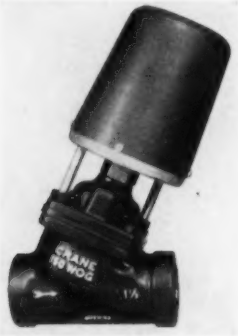
NEW PRODUCTS

(Begins on page 168)

and from ¼ to 10 hp at temperatures to 150 F, depending on fan diameter. Discharge direction of housing can be adjusted. Chicago Blower Corp.

84—CONTROLLER for remote, automatic valve control

An all-electric rotary valve controller for mounting on the valve stem, the Valvetrol, is designed to provide remote or automatic valve operation with proportional or on-off control. The Valvetrol is a self-contained gear motor with hollow output shaft that receives the valve stem. Stem diameters ¼ to 1 in. can be accommodated. When used on



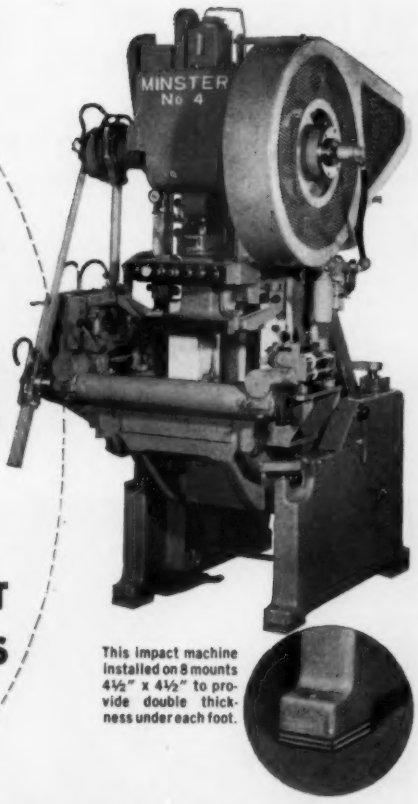
rising stem valves the adapter "swallows" the stem. The Valvetrol has a built-in potentiometer which may provide remote indication of valve position or be used as a part of a balanced bridge control. Typical of the latter is use of the unit in automatic proportioning systems where the valve setting must be proportioned to a signal that may originate from liquid level, flow rate, pressure or other source. Manufacturer says Valvetrols can be furnished to provide follow-up accuracies of ± 1/25 of 1 per cent; standard low cost models offer accuracies of 1/5 of 1 per cent.

Valvetrols are designed to mount on the valves of many manufacturers. Gear ratios can be had to produce various torques and operating speeds. Selective gear ratios to the potentiometer adapt the unit to valves having from 1/6 to 40 turns to full open. Permanent split capacitor or three-phase Valvetrols come in totally enclosed or explosion proof design. The unit can be furnished mounted on the valve, or is available separately. The Jordan Co.

85—MIDGET LIFTERS are easy to handle, and strong

Type C Pull-A-Way is announced as a strong, tough, versatile and easily-handled unit for all raising, lowering and pulling jobs. The lightweight device has a frame of forged aluminum alloy. It is suggested for moving motors and other machinery, opening freight car doors, stretching and holding tension supports,

THIS MINSTER No. 4 PRESS IS INSTALLED ON VINYL Air-Loc 4·17·4 THE MOUNT THAT HOLDS



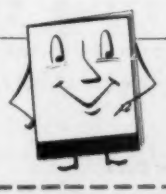
This impact machine installed on 8 mounts 4½" x 4½" to provide double thickness under each foot.

Air-Loc® 4·17·4 THE VINYL MOUNT that dampens vibration, gives you these advantages . . .

1. VINYL CONSTRUCTION is impervious to oil, water, alkali and weak acids. 2. EASY TO CUT with a power saw. 3. PERMANENT MACHINE ALIGNMENT. 4. PRECISION SHIMMING is easy. 5. REUSABLE when relocating machines. 6. NO "WALKING", anchored by friction without bolts or cement. 7. REDUCES VIBRATION up to 85% due to patented construction.

● Return coupon today to prove this in your own plant.

Free Booklet and Samples. Return Coupon Today.



Precision grinders, lathes, planers, etc. installed on AIR-LOC *maintain level* and operate at peak efficiency because transmitted vibration is reduced as much as 85%.

AIR-LOC DIVISION
Clark, Cutler, McDermott Co., Franklin, Mass.

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TITLE _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE ____ STATE ____

For more facts circle 649 on Reply Card

NEW PRODUCTS

(Begins on page 168)

setting pipe in trenches, skidding loads, holding cement forms and other "quick hook-up jobs." Manufacturer says its engineering features are similar to its larger counterparts—it has a double interlock to keep the brake from slipping, an automatic notch-per cycle letdown, and a safety handle to prevent serious overloading. It is available in 1½-, 3- and 6-ton capacities. Standard lift of all units is 5 ft. For the smallest size, the full load pull on the handle is 83 lb. It weighs 23½ lb. Wright Hoist Div., American Chain & Cable Co., Inc.

86—PUSHBUTTON features an indicating light

An illuminated oiltight pushbutton, the CR2940UW, combines in one unit the functions of both pushbutton and indicating light. It is reported to save about 50 per cent in panel space. Readily fitted in the same hole and mounting space as existing oiltight units, the device can be panel-mounted or back-mounted, according to company. It has transformers rated for 110, 220, or 440v, 60 cycles. The pushbutton unit's transformer offers the safety of a completely insulated secondary winding, it is noted, and is potted in permafil compound for strength and resistance to mechanical damage. The strongbox transformer is the same size as the heavy-duty oiltight contact block, which is the same as used in conventional units. The pushbutton unit may be had in guarded or unguarded form; it uses company's No. 12 6-v bulb. Color caps come in six colors. General Electric Co.

87—SHORTER TRUCK works in tight aisles, elevators

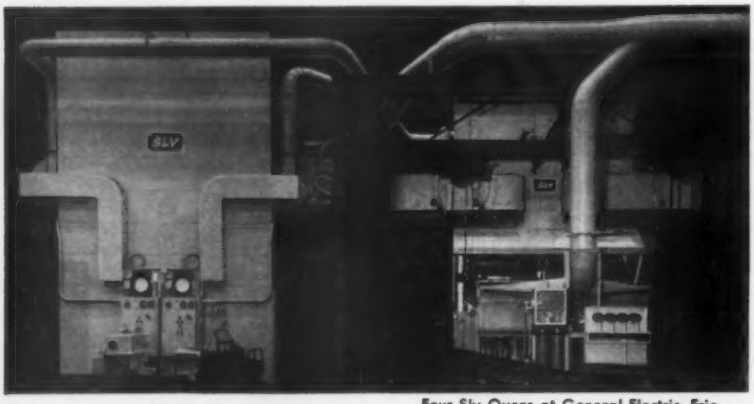
This electrically-operated industrial lift truck has a capacity of 1500 lb and is only 48 in. long. A revision of company's Docker, the new truck incorporates its prime features, but offers increased maneuverability, being 6 in. less in overall length. This is possible due to use of

higher, narrower batteries. They have a capacity of 500-700 amp per hour and are reported capable of running an 8-hr shift without recharge.

The truck has a turning radius of 49½ in. and will operate in a 50-in. right angle intersecting aisle. Its lifting height is 135 in. with a mast height of 83 in., or 105 in. of lift with 68-in. mast height. Its traveling speed is 5 mph and it comes with hydraulic mono-lift or duo-lift mechanism. The operator's platform is only 7 in. off the ground, enabling a 6-ft operator to go through a 7-ft box car doorway standing upright. The low mounting feature is also an advantage where operators must get on and off frequently. Automatic Transportation Co.

88—MULTI-USE LUBE is molybdenum-based product

Gear-Moly is announced as the aspirin of the lubrication field because it solves many industrial lubrication headaches. A ltitle bit goes a long way to reduce bearing wear and failure and in lengthening gear tooth life, according to manufacturer. Gear-Moly is reported of great value, also, on sliding surfaces and worm drives, and to keep rubbing areas friction free and gear cases cool. Gear-Moly contains microscopically ground molybdenum disulfide suspended in SAE 90 gear oil. A small quantity added to heavy oils and greases works wonders, it is claimed, only 2 oz per pound of oil



Four Sly Ovens at General Electric, Erie.

4 SLY Ovens Give Close Baking Control at G. E.

Correct baking of varnish on armatures, field coils and frames is essential to insure full protection to the units in later use. Four tower-type Sly Ovens at the Direct Current Motor and Generator Department at General Electric Co., Erie, Pa., provide the exact temperature required. They are an integral part of production, assuring a smooth, continuous flow.

The ovens are arranged in pairs. Each is a double-compartment oven with a common wall separating the zones. Each zone has its own heating and control system and individually automatic, program controlled conveyor system to meet the required, preheat, first and second baking operations. Complete cycle includes preheating, varnish dip, 4-hour bake, varnish dip and another 4-hour bake. Operations are such that the ovens reach their required temperatures prior to the start of the work day.

This installation is typical of the time and money savings Sly Convectioneered Ovens bring to drying, baking and finishing operations. *Write for catalog describing Sly's complete line.*

Designers and Manufacturers of: Dust Control Systems, Industrial Ovens, Blast Cleaning Equipment, Tumbling Mills.

THE W. W. SLY MANUFACTURING CO.

SINCE 1874

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OFFICES IN PRINCIPAL CITIES

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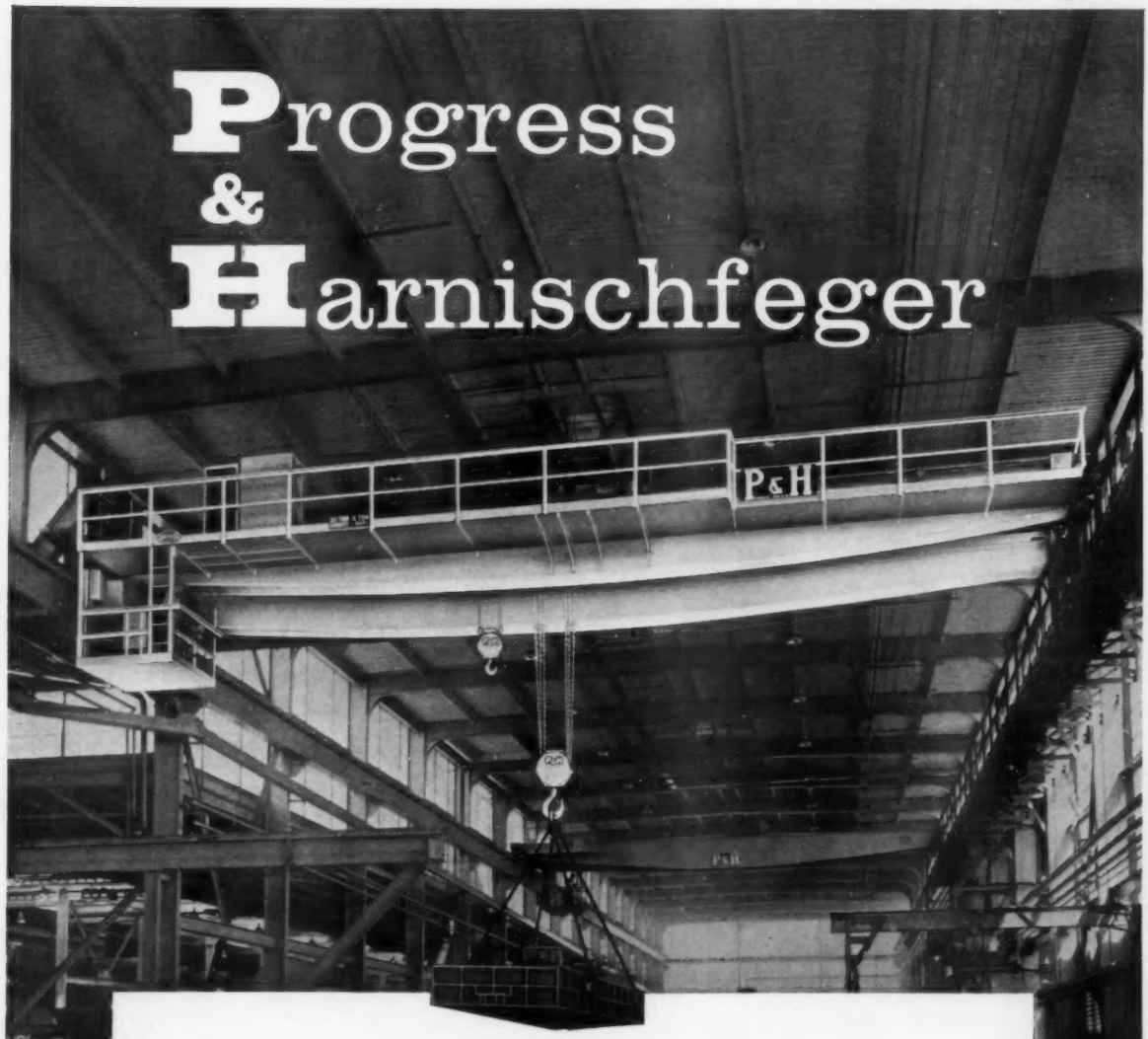
A two-word history of the overhead-crane industry!



. . . and now a NEW concept– P&H electronic "stepless" control

In overhead cranes, P&H has steadily pioneered new crane design. Now, P&H again moves years ahead of the industry with the modern concept — electronic, "stepless" control . . . excellent control response coupled with extreme simplicity. There are 60% fewer wearing parts in this new overhead crane control.

From P&H you get the most modern crane built—and one that stays modern, as this new control can be applied to existing AC-crane installations.

Write for detailed information and data on this money-saving development, "Electronic Crane Control." Address Dept. 100C, Industrial Division, Harnischfeger Corp., Milwaukee 46, Wis.

HARNISCHFEGER
P&H INDUSTRIAL DIVISION
MILWAUKEE 46, WISCONSIN

For more facts circle 651 on Reply Card

PIPEMASTER

"Darn right! Pipemaster is the best wrench in the business! I've been usin' wrenches long enough to know. Tried 'em all—and it's Pipemaster for me. Why? Because it's better *balanced* . . . it's *easier* to work with, and it's got that patented Pipemaster double-action spring that makes those jaws really grip, ratchet and let go. And heavy-duty Pipemasters are lighter weight without sacrificing strength! You'll love 'em . . . so will your men."

Ask for Erie Pipemaster's completely redesigned line of hand pipe tools—wrenches, cutters, vises, stands, threaders, tubing cutters, and flaring tools. All parts of all Pipemaster tools are factory job-tested and unconditionally guaranteed. At your supply house, or write:

ERIE PIPEMASTER

ERIE TOOL WORKS

ERIE, PA., U. S. A.

IN CANADA—ETF TOOLS LTD., ST. CATHARINES, ONT.

For more facts circle 652 on Reply Card

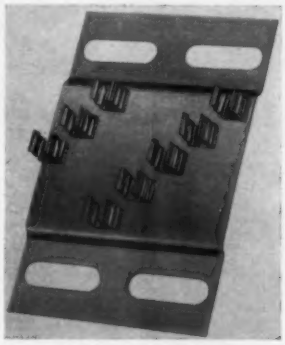
NEW PRODUCTS

(Begins on page 168)

or grease being required. An 8-oz can of Gear-Moly sells for around $2.00. Pacific Lubricants Co.

89—TUBE CLIPS provide accurate tubing positioning

Designed for company's system of expanded metal trough for protection and support of instrument tubing, these tube



clips provide accurate positioning for the tubing by bolting them to the bottom of the trough. Clips are available for ¼ or ⅜ in. tubes and in the standard widths of 6, 9, 12, 18 and 24 in. Most types of tubing require rigid positioning every 2 ft, company states, but the clips can be positioned at any interval. Instrof Corp.

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 247-248

90—FLOOR MAT wipes the dirt from shoes

This rubber mat has flexible, heavy-duty V-shaped ribs which serve to scrape dirt and mud off shoes with a "windshield

wiper" action. The ribs also offer a friction surface to prevent slipping. The V-rib design comes in a straight horizontal pattern or a horizontal-vertical checker-board pattern. Wear Proof Mat Co.

"You say I can see vibration, measure it, and eliminate it?"

1 "How much vibration do you think my machine has?"

No need to guess—the Veelos Vibration Analyzer shows exactly! This amazing electronic tester measures vibration amplitude down to *2-millionths of an inch*—tests one belt against another, actually shows which belt has "invisible shakes" . . . and how much! Don't guess about vibration; it's costing you hard cash every minute you ignore it. Ask your Veelos salesman to test your belts with the Vibration Analyzer.

2 "Isn't vibration caused by a number of things?"

Vibration can be caused by bearings, motor, clutch, sheaves or V-belts. Quite often it is caused by V-belts alone. The Veelos Vibration Analyzer uses a "strobe" light which "stops" the motion—shows exactly *what* is vibrating! It shows you precisely how much vibration you're paying for, and lets you correct it. The Vibration Analyzer gives positive proof, and the test takes only 15 minutes. It's free, of course.

3 "How do I eliminate costly belt vibration?"

Install Veelos, in place of ordinary V-belts! V-belts have spots of varying density, due to their construction, which throw them out of balance. Veelos belts are absolutely uniform; every stud and link is identical; *every foot of the reel* is identical and uniform; and they're perfectly balanced! Test any belt for vibration against Veelos—you're in for a shock. Your Veelos salesman will show you how to cut costs and improve your operation.

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VEELOS
THE BALANCED
LINK V-BELT

Veelos is known as Veelink outside U.S.A.

For free vibration analysis or Veelos Data Book write to:

MANHEIM

Manufacturing & Belting Company
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"Industrial Belt Specialists Since 1911"

Adjustable to any length • Adaptable to any drive • Balanced power • Constant power • Vibrationless power

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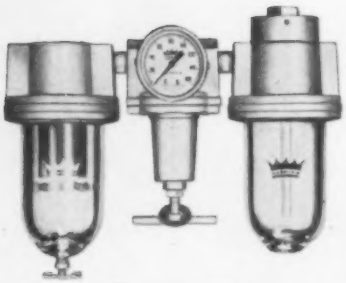

NEW *Crown* BULLETINS TELL HOW...

Hannifin's newest development, the Crown Line of FILTERS, REGULATORS and LUBRICATORS, saves money wherever air power is used. The filters remove dirt and scale without robbing you of precious power. The regulators let more air through when it's needed than other regulators do. The lubricators operate on minimum pressure differential —they are quicker and easier to fill, too. Available now—local, distributor stocks in many areas. Write for bulletins and for name of nearest distributor.

"COMBO" UNITS
Bulletin 300

REGULATORS
Bulletin 301

FILTERS
Bulletin 302

LUBRICATORS
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COMPLETE RANGE OF SIZES

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FILTERS • REGULATORS • LUBRICATORS

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Send me your Crown Bulletins and name of nearest distributor.

Name.....
Position.....
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City.....*State*.....

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NEW BOOKS

for the plant engineer

Mechanisms and Dynamics

MECHANISMS AND DYNAMICS OF MACHINERY by H. H. Mabie and F. W. Ocvirk. Size 9¼ by 6⅛ in.; 442 pp including index; illustrated; cloth bound. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N.Y. Price $8.50.

THIS BOOK is principally a textbook for engineering students. However, it could be of use as a reference and refresher for graduate engineers. The type of technical man is mentioned because it is advisable for users of this book to have completed courses in mechanics and calculus for a better appreciation of its contents.

In the first of two main parts the book deals with mechanisms and includes the following in the chapter designations: linkages, cams, spur gears, gear trains and introduction to computing mechanisms.

The second part contains information on machine dynamics. Some of the topics treated in this portion are: vectors, linear and angular motion, instantaneous centers, forces on gear teeth, analytical determination of unbalance, natural vibration and damping.

Mathematical Refresher

TRIGONOMETRY REFRESHER FOR TECHNICAL MEN by A. A. Klaf. Size 8 by 5⅜ in.; 629 pp including index; paper bound. Published by Dover Publications, Inc., 920 Broadway, New York 10, N. Y. Price $1.95.

THIS BOOK is presented principally in a question and answer form. Its three main sections pertain to: plane trigonometry; applications of plane trigonometry; and spherical trigonometry.

Some the 14 chapters in the first portion cover the following subjects: fundamental trigonometry functions; relationship of angular measurements; logarithms; solution of triangles; and the slide rule. The latter includes information on construction of scales and operations. A series of practice problems are presented at the end of this chapter.

In the second section the author has given attention to vectors and vector quantities, surveying problems, complex problems. Among other subjects, there is material on navigation included in this portion.

The third section begins with an introduction to spherical trigonometry covering basic details. It continues

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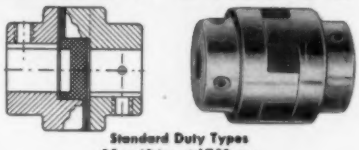
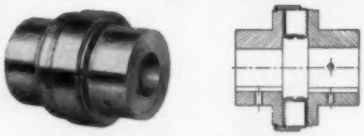
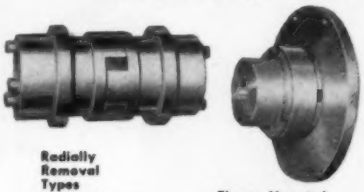
FLEXIBLE
COUPLINGS



Standard Duty Types
.05 to 40 hp. at 1750 rpm.



Medium and Heavy Duty Types
2.6 to 810 hp. at 100 rpm.



Radially Removal Types
1.9 to 30 hp. at 100 rpm.—2 to 40 hp. at 1800 rpm.

Flange-Mounted Types
11 to 740 hp. at 900 rpm.

Put Trouble-Free Performance Into Your Equipment

COMPARE THESE FEATURES:

- A type and size perfectly suited to your application.
- Year-after-year dependability, regardless of load or operating conditions.
- Completely machined for ease and speed of alignment.
- No lubrication required.
- Simple, rugged construction—few parts and no intricate mechanisms.
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- Cushions are engineered to the load and service conditions.

Ask Lovejoy to recommend the exact flexible coupling for your application. No obligation. Request catalog.

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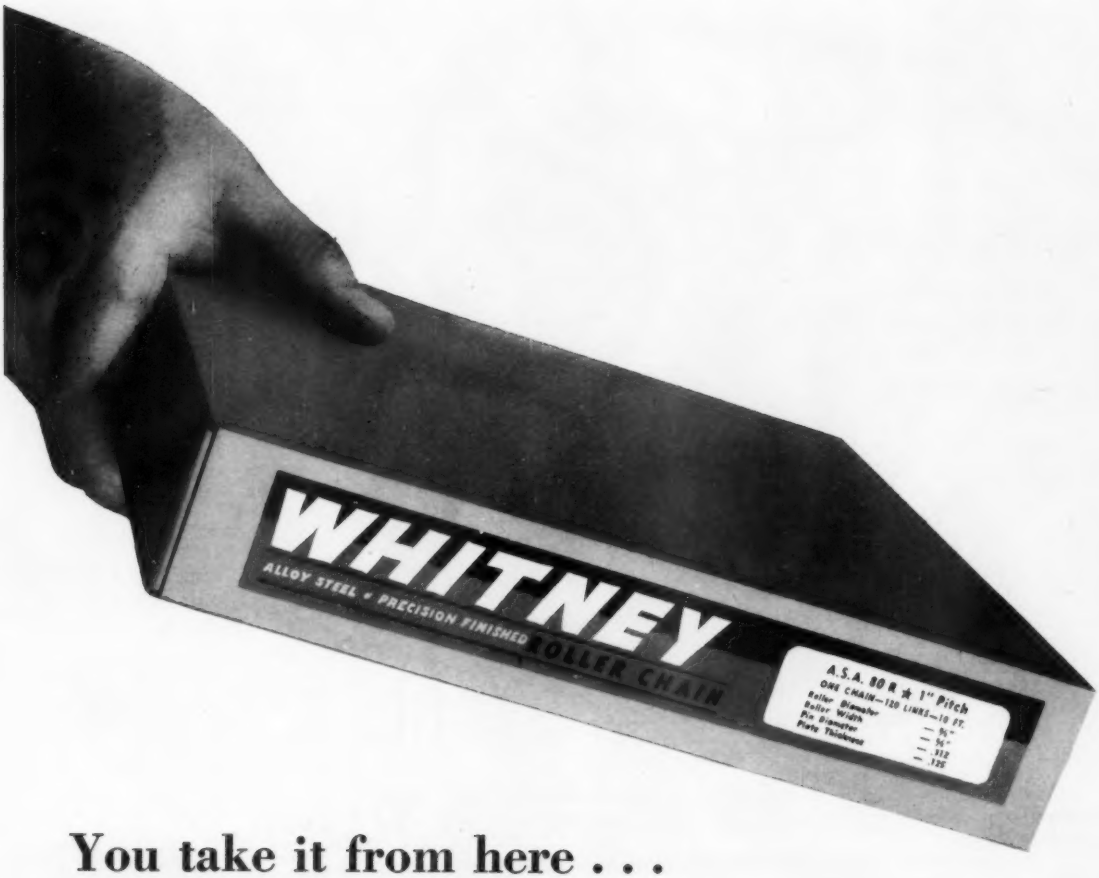
WHITNEY
ALLOY STEEL • PRECISION FINISHED ROLLER CHAIN
A.S.A. 80 R ★ 1" Pitch
ONE CHAIN—120 LINKS—10 FT.
Roller Diameter — ½"
Roller Width — ½"
Pin Diameter — .312
Plate Thickness — .125

You take it from here . . .

Your first step towards maximum drive and conveyor chain performance is to specify Whitney . . . the precision engineered line of Roller, Silent, Conveyor and Self-Lube Chain.

When you specify Whitney Chain . . . you gain a number of "extras" that all add up to peak production at lowest over-all expense. For example, Whitney's exclusive design advancements such as "F-R" (fatigue resistance) Roller Chain and Self-Lube Roller Chain may answer application requirements that hitherto had "no answer."

Whitney Self-Lube Single and Double Pitch Roller Chains outlast regular chain by as much as 5 to 1 under continuous operation exposed to dirt or moisture. SECRET? Whitney's exclusive Sintered Steel Bushings that "oil from the inside" . . . are prelubricated for life. Ideal for applications in food, drug, textile and similar industries where external chain lubrication may not be practical or desirable.

And Whitney's "F-R" Processed Roller Chains are establishing new standards for durability, particularly on problem drives involving unusual operational conditions, stresses and heavy shock loads. Whitney's "F-R" process offsets excessive operational stresses in the chain . . . assures a ruggedness that's really "extra"!

Your local Whitney Distributor has a vital "extra" . . . in the competent factory trained Whitney field engineers who can assist him in solving your drive problems. And your Whitney distributor provides swift "off the shelf" stock service on all A.S.A. chains and sprockets.

ADDED UP . . . IT'S WHITNEY'S "EXTRAS" THAT KEEP YOU WELL AHEAD OF COMPETITION.

CREATORS OF SELF-LUBE CHAIN

Whitney

CHAIN COMPANY

232 HAMILTON ST., HARTFORD 2, CONN.

ROLLER CHAIN • SILENT CHAIN • CONVEYOR CHAIN • SPROCKETS • FLEXIBLE COUPLINGS

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with

Ransohoff

cabinet type

INTER-PROCESS WASHER

- Designed for washing parts between machining operations

● Small in size and BIG in results! Ten of these Ransohoff Cabinet Type Washers were recently shipped to the automatic transmission plant of a big-3 auto manufacturer.

These machines, installed between machining operations, wash parts up to 16″ wide, 12″ high and 30″ long.

Solution tank heated by gas, can be designed for oil, steam or electric heating. Pneumatic door controls interlock with spray system. Complete factory wiring and piping permits quick installation.

Send details of your cleaning requirements for Ransohoff ideas. Write today: Ransohoff, Inc., 650 N. Fifth Street, Hamilton, Ohio.

Ransohoff *The oldest name... the newest ideas*

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You'll find two postage-free Reader Service Cards on pages 247-248. Use them for ordering product information—just circle item numbers of those you want. You may also use the cards for requesting advertised catalogs.

with a chapter on spherical triangles which is followed by one on applications of spherical trigonometry.

An appendix contains formulas and mathematical tables. The book also includes answers to odd-numbered problems.

Urban Industrial Structure

THE INDUSTRIAL STRUCTURE OF AMERICAN CITIES by Gunnar Alexandersson. Size 9⅞ by 7¼ in.; illustrated; cloth bound; 1956 edition. Published by the University of Nebraska Press, 1125 R Street, Lincoln 8, Nebraska. Price $6.50.

LOCATIONS of various types of industries in the United States are covered in this book. It examines the national distribution patterns of 36 urban industries represented in the 1950 census.

In a field in which studies of individual cities have appeared, this work represents a different, comparative approach. It embraces 864 cities with 10,000 or more inhabitants.

Text is supplemented by maps that illustrate significant regional and functional characteristics between cities. There is a big four color fold-out map, 16 maps in two colors, and additional maps printed in black.

Pumps

PUMP SELECTION AND APPLICATION by Tyler G. Hicks. Size 9¼ by 6¼ in.; 422 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36, N. Y. Price $8.50.

MORE THAN 400 illustrations complement the description of a wide range of problems and pump types in this guide. Step by step procedures from analysis to the application of the pump to the conditions encountered are presented.

Part one deals with the three general classes of pumps, namely centrifugal, rotary, and reciprocating. It covers the characteristics of all three. In the chapter on reciprocating units, there is information on packing valves, and variable capacity devices.

The pump selection section includes material on such topics as pump head, capacity, piping systems, drives, and pumping-system economics. In the chapter pertaining to economics, the author has given consideration to the comparison of different schemes, preliminary cost estimates and modernization of existing installations.

Some of the applications discussed in part three pertain to the following: steam power plants, nuclear energy, petroleum, paper, textiles, rubber, food, water, air conditioning, hydraulic systems mining and construction.

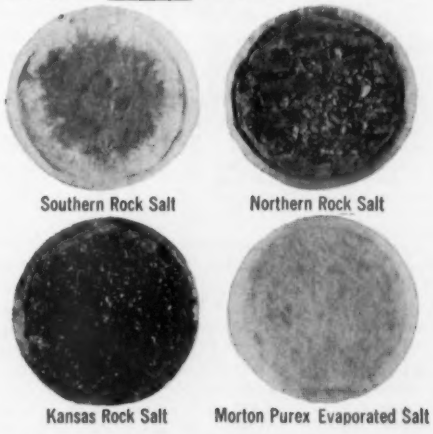
Switch to sludge-free Purex Salt

In every 100 lbs. of rock salt you buy you assume the risk of paying for up to 5 lbs. of insolubles or sludge—shale and sulphates. This means that in a 50-ton carload of rock salt you may pay for as much as 5,000 lbs. of sludge! This insoluble matter is included in the purchase price of the rock salt and accounts for part of your freight bill. It also necessitates periodic cleaning out of your brine making system.

But when you buy Morton Purex Salt, you get high-purity evaporated salt that is made in a controlled particle size to prevent packing and channeling. With Purex, none of your purchase price or freight bill goes toward paying for insolubles or sludge.

With Purex, no time or labor is wasted in cleaning out insoluble matter from your brine making system to keep it functioning at peak capacity. For Purex is 100% soluble. Morton Purex Salt will leave no accumulation of material in either the brine or water softener tanks. It can be used in bulk wet storage systems and in the Morton Model E Brinemaker.

These filter pads (approximately 1/5 actual size) show you how much insoluble matter (sludge) you get in just 5 lbs. of various kinds of salt.



Southern Rock Salt | Northern Rock Salt

Kansas Rock Salt | Morton Purex Evaporated Salt

Tests for insolubles taken from these random samples show you that Morton Purex is the only one that contains no wasteful sludge, or insolubles.

For more information about Morton Purex Salt and for free, expert help on any water softening or brine making problem, write or wire:

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Chicago 3, Illinois

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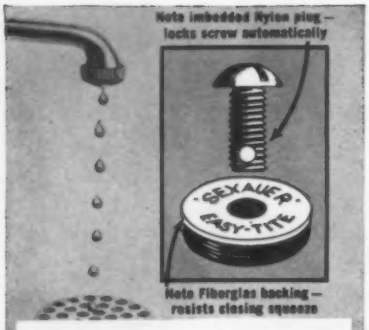

Why Faucets Leak

—9 out of 10 washers are fastened with —TOO LONG or SHORT screws. The screws —QUICKLY LOOSEN, thus loose washers —are destroyed thru grind and squeeze —of opening and closing faucets.

34 years of research uncovers new solution

—Now, NEW (Patented) 'Sexauer' SELF-—LOCK Monel screws, with an imbedded —expanding NYLON PLUG, lock at the re-—quired depth AUTOMATICALLY—hold —washers FIRMLY!

—Made of rustproof, non-corroding —MONEL, heads don't twist off or screw —slots distort. They are easy to remove —when necessary, can be used over and —over.

—Used with NEW 'Sexauer' EASY-TITE —faucet washers, this combination out-—lasts past faucet repairs "6 to 1"! —EASY-TITES are made of super-tough, —pliable du Pont compound (neither rub-—ber nor fiber) and reinforced, like a —tire, with a vulcanized layer of Fiber-—glas, they resist distortion and splitting —from shut-off grind and squeeze.

The hidden costs of faucet leaks!

Faucet leaks are costly! As authenticated by Hackensack, N. J. Water Co. and American Gas Association, STOPPING just ONE PIN-HOLE SIZE (1/32") LEAK can reduce water waste 8,000 gal. quarterly. If a HOT WATER FAUCET LEAK, water and fuel savings JUMP to over $7.58 QUARTERLY—plus additional savings on MATERIALS—LABOR—and *costly* FIXTURE REPLACEMENTS!

NEW SELF-LOCK screws and EASY-TITE faucet washers are just TWO of the "SEXAUER" line of over 3000 TRIPLE-WEAR plumbing repair parts and Pat'd. precision tools.

A "SEXAUER" Technician in your vicinity will make our NEW 126 page Catalog "H" available. He will gladly consult with you regarding a SURVEY of your plumbing fixtures to determine correct repair parts required and establish reasonable stock levels that avoid both overstocking and shortages—thus providing for efficient stock arrangement and control—all without obligation. WRITE TODAY.

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Gentlemen: *Please send me a copy of your NEW, 126 page Catalog "H."*

My name..... Title.....

Company or Institution.....

City ..... Zone .... State .....

SEXAUER
WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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Convair's Parking Formula

(Continued from page 98)

been backed up by more San Diego Police Department traffic officers . . . at least four officers to keep traffic moving. One patrolman is stationed at the rider-driver lot . . . to refuse entrance to cars with less than three occupants. Another handles inflow to the supervisors' lot. A third directs traffic at entrances to the general lot.

Another sizeable aid is the installation of new lighting . . . security type . . . set on 80-ft centers along all fences. This will help during late winter afternoons and during the nighttime swing-graveyard break.

Says Convair's Frank Merritt, Chief of Industrial Security, "We believe we have our traffic problem in hand now. We have solved at least 75 per cent of the jam. Although we'll always have a traffic problem, we have traffic flowing now, have reduced the jams, and are clearing lots in half the former time. Our employees are getting a morale boost from our new approach. There was a time when there was a shift-end race to punch out and get to your car in the hope of beating the jam. This was guaranteed to fray nerves and turn the last half-hour of the dayshift into something less than totally productive. However, it must be pointed out that there is still much to do. With the continued cooperation of the San Diego Police Department Traffic Bureau and its personnel, we hope to accomplish an increasingly efficient system of traffic control."

Actually, Convair's solution was both straightforward and simple. Without additional parking space, it could hardly work a miracle. Its plant engineers merely did the obvious: 1. Introduced the rider-driver plan to reduce the number of cars. 2. Warn swingsters away from lots before they had a chance to clear. 3. Provide more exits to speed clearance. 4. Put more police on duty to keep traffic moving. 5. Increase in-lot flow by better surfacing and maximizing space through restalling. 6. Provide more light for dusk to dark parking.

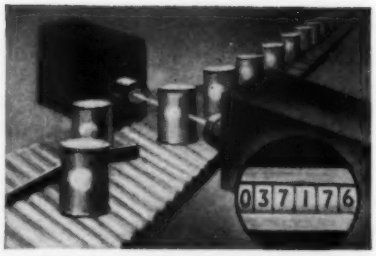
Yet these simple expedients have halved exiting time . . . and permitted admittedly too small lots to handle at least 30 per cent more cars.

New Plant Construction

(Continued from page 144)

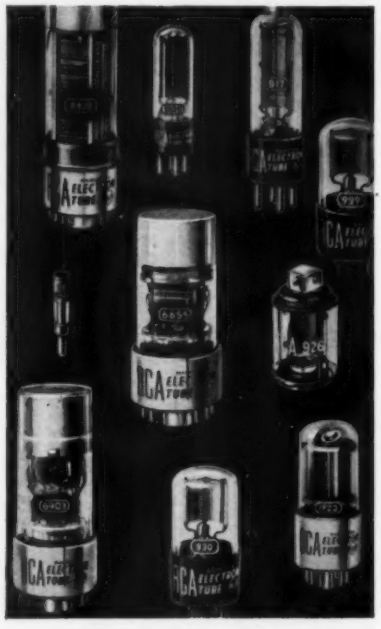
production of zirconium facilities. A new building is planned to house mills, pulverizers, mixers, dryers and tanks used in the production of zirconium oxide and silicate.

Westbury, L. I., N. Y.—Servomechan-



DEPENDABILITY... WHERE IT COUNTS

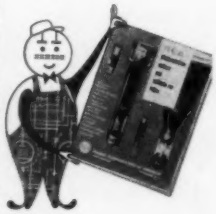
RCA Phototubes



For long-term dependability in light-actuated equipment, specify RCA Phototubes. They offer a proven record of faithful service in applications involving light measurements, scintillation counting, color matching, and sound reproduction.

RCA Phototubes are available in a variety of spectral-responses, sensitivities, and physical sizes to meet your specific needs. For quick service, call your RCA Industrial Tube Distributor.

HANDY REFERENCE 24-page book (CRPD-105) containing technical data on 109 RCA tubes—including Multiplier Phototubes, Phototubes, Storage Tubes, Cathode-Ray Tubes, and TV Camera Tubes. Free—from RCA Commercial Engineering, Harrison, N. J.



RCA **TUBES FOR INDUSTRY**
Radio Corporation of America
® Tube Division Harrison, N. J.

For more facts circle 660 on Reply Card

MECHANIZE *all Scrubbing Operations into 1*

with a COMBINATION SCRUBBER-VAC!

Applies cleanser, scrubs, flushes, and picks up—in ONE operation!

(Powder Dispenser and Level Cable Wind are accessories)

Here's a timely answer to the need for reducing labor costs—*a single cleaning unit that completely mechanizes scrubbing.* A *Combination Scrubber-Vac* applies the cleanser, scrubs, flushes if required, and picks up (damp-dries the floor)—*all in one operation!* Maintenance men like the convenience of working with this single unit... the thoroughness with which it cleans ...and the features that make the machine simple to operate. It's *self-propelled,* and has a *positive* clutch. There are no switches to set for *fast* or *slow*—slight pressure of the hand on clutch lever adjusts speed to desired rate. The powerful vac performs quietly.

Finnell's 213P Scrubber-Vac at left, for heavy duty scrubbing of large-area floors, has a 26-inch brush spread. Cleans up to 8,750 sq. ft. per hour (and more in some cases), depending upon condition of the floors, congestion, et cetera. (The machine can be leased or purchased.) *Finnell* makes a full range of sizes, and *self-powered* as well as *electric* models. From this complete line, you can choose the size and model that's exactly right for *your* job (no need to *over-buy* or *under-buy*). It's also good to know that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of the machine and to make periodic check-ups.

For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 5304 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

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isms, Inc., producers of electronic and electro-mechanical systems has announced plans for the construction of a new plant in Nassau County, Long Island, N. Y. New plant will have a floor area of 55,000 sq ft and will house company's engineering and production facilities. New plant will cost approximately $1 million.

New Bern, N. C.—Union Bag-Camp Paper Corp., Woolworth Bldg., 233 Broadway, New York, N. Y., has plans under consideration for the construction of a new paper mill on large tract of land near here. Plant is planned for an initial capacity of 600 tons daily, and will represent an investment in excess of $50 million when completed.

Toledo, O.—Standard Oil Co. of Ohio has authorized plans for construction of oil refinery on 20-acre tract within company's present facilities, and plant is scheduled to be completed by April, 1958. M. W. Kellogg Co., New York, N. Y. have been awarded construction contract reported to be approximately $34 million.

Wellington, O.—Armco Drainage & Metal Products, Inc., 1939 Armco Ave., Middletown, O., plans to construct a new manufacturing plant. New plant will produce corrugated metal pipe and pipe arches, paved pipe and pipe arches, large diameter sewer pipe and pipe fittings. Cost of plant estimated at $500,000.

Unequalled Filtration for Metalworking

and ONLY Delpark HAS IT!

THE Filter-Matic TUBULAR SCREEN VACUUM FILTER

• FOR LOW MICRO-INCH FINISH REQUIREMENTS
• HIGH CAPACITY FLOW RATES
• MINIMUM SPACE REQUIREMENTS
• AUTOMATIC, SELF-CLEANING

FOR COOLANTS, CUTTING OILS, ROLLING OILS, SOLVENTS AND CLEANERS AND ALL LIQUIDS REQUIRING REMOVAL OF MINUTE PARTICLES.

Designed and developed by Delpark to answer an urgent need of industry . . . particularly in the metalworking field. The demand for this proves that Delpark's new filtration concept is opening the way to better filtration at less cost. Here again is proof that industry searching for better, more efficient filtration looks to Delpark . . .

FIRST in Filtration Advancement

Delpark

Backed by more than 40 years experience in industrial filtration

INDUSTRIAL FILTRATION COMPANY
165 INDUSTRIAL AVENUE
LEBANON, INDIANA

For more facts circle 662 on Reply Card

Ada, Okla.—Ideal Cement Co., Denver National Building, Denver, Colo., plans to construct a new cement plant with an annual capacity of 1.5 million bbl. Contract in the amount of $6 million has been awarded to Fruin-Colnon Construction Co., St. Louis, Mo. Construction of new plant is already under way and when completed in early 1959 will represent an investment of $14 million.

Oklahoma City, Okla.—Continental Oil Co., Houston, Texas, has plans under way to construct a new natural gasoline plant in the Short Junction oil field just south of here. Plant will have a large capacity and is scheduled for completion in mid-1957. Tuloma Builders, Inc., Tulsa, Okla., has been awarded the construction contract reported to be in the neighborhood of $1.8 million.

Coatesville, Pa. — Lukens Steel Co., 1949 Gillen St., has announced a major expansion program with a total expenditure of some $40 million. Spring plans of company call for construction of facilities which will boost annual rated capacity of ingot production from 750,000 tons to 1.1 million tons. This program is scheduled for completion in mid-1959.

Erie, Pa.—Erie Forge & Steel Corp., 17th & Gaus St., steel forgings, castings, rods, grinding rolls, has authorized plans for an expansion and modernization program of company's local facilities. Expansion will include addition of a 75-ton electric steel-making furnace to augment company's open hearths and construction of a modern new foundry. Cost of program estimated at approximately $4 million.

Farrell, Pa.—Sharon Steel Corp., Sharon, Pa., hot and cold rolled steel strip, carbon, alloy and stainless strip, plans to construct a huge electric steel furnace at company's Roemer Works, here. New furnace scheduled for operation in the spring of 1958 will double Sharon Steel's present 72,000-ton capacity of electric furnace steel. Cost of new furnace installation will approximate $6 million.

Anacortes, Wash.—Texas Co., Chrysler Towers, New York, N. Y., plans to construct a new 40,000-bbl a day oil refinery near here. Engineering work on the plant has already begun and work will begin soon on the construction of the refinery scheduled to be placed in operation by early 1959. Cost reported to be $60 million.

Tool Costs Down 1½ Million

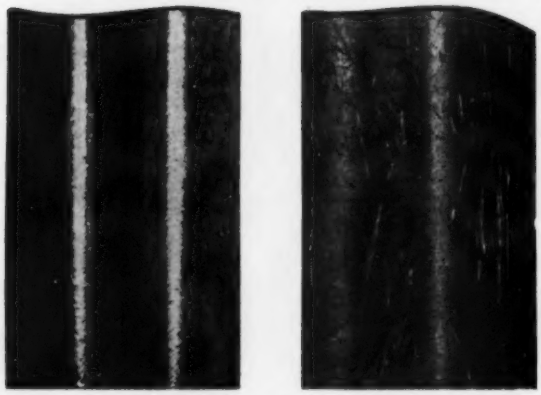
(Continued from page 107)

crib have been drastically reduced, and in some cases the size of the tool crib has been reduced also.

As a final control—the one with a cudgel in its hand—a folder on each employee is kept in the Plant Protection office. Requisitions covering un-

Only structoglas® "A" GLAZING

HAS BEEN PROVEN SUPERIOR BY OUTDOOR EXPOSURE TESTS



Unretouched 18-month test samples

STRUCTOGLAS "A" PANEL made from extra-hard new Paraplex® P-444 resin*.

COMPETITIVE PANEL made from a good light-stabilized standard resin.

FACT 1. Before testing, the above panels were identical in surface gloss, color, appearance.

FACT 2. After 18-month exposure in south Florida, competitive panel had lost all surface gloss, was badly discolored, exposed glass fibers. STRUCTOGLAS "A" showed no erosion and only slight color change.

FACT 3. Proven superiority of STRUCTOGLAS "A" results from new resin not used in other reinforced panels.

FACT 4. STRUCTOGLAS "A" costs no more than ordinary plastic panels.

** A product of Rohm & Haas Company*

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T348-TM

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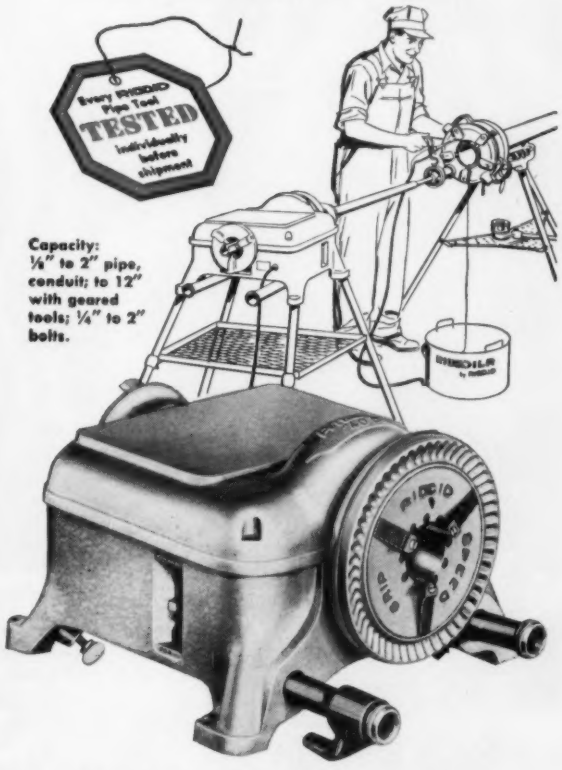
You can't afford to cut, ream and thread pipe by hand!


Every RIDGID Pipe Tool TESTED individually before shipment
Capacity: ⅛" to 2" pipe, conduit; to 12" with geared tools; ¼" to 2" bolts.
RIDGID
SPEED CHUCK

RIDGID 400A

powers your hand tools . . . saves you time and work!

Your job is so much easier, faster when this stout little power drive turns pipe, conduit, rod for your hand tools. Easy hand-action Speed Chuck holds tight forward or reverse. Full of RIDGID features that give you far the most time and work saving for your money—see it, try it at your Supply House.

The Ridge Tool Company, Elyria, Ohio, U. S. A.

RIDGID

Work-Saver Pipe Tools

For more facts circle 664 on Reply Card

returned tools eventually find their way into this folder. When any folder becomes unusually bulky, an investigation is made. If at that time, or when he terminates employment, the employee cannot produce the more durable perishable tools, such as drill motors, reamers, etc., they are charged against him, but at a properly depreciated rate. But for protection's sake, this depreciated rate is never allowed to reach zero value. A tool is always considered to maintain a minimum value.

It's quite evident from the above that the only thing spectacular about this drive to reduce perishable tool costs was the results obtained. Most of the measures employed could be used in any plant interested in reducing perishable tool costs.

"But don't make these perishable tool controls too stringent and inflexible," Fred Lorenz warns. "Try to strike a happy medium, or it may cost more to save a tool than the tool is worth. This would undoubtedly happen if any control involved excessive paper work along with an increase in clerical help to handle it."

Lathe Operators' Helpers

(Continued from page 139)

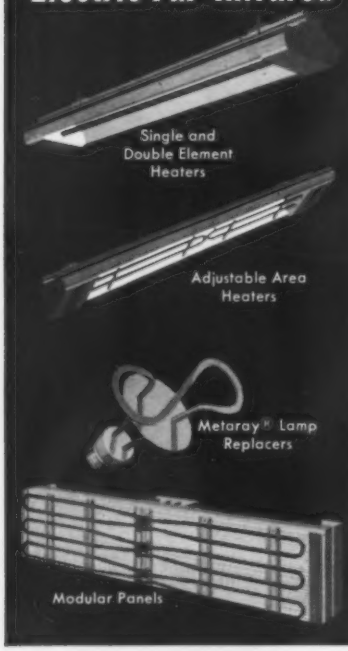
one of the bolt slots cast into the chuck face, and a nut locks the block to the chuck body. This device is a bit slower in use than the sling but it is equally effective and very safe.

A more elaborate form of built-in handling device for heavy lathe chucks is illustrated in Fig. 4. Instead of a miniature jib crane, the device is in the form of an articulated hinge. The hinge is secured at one end to the headstock gear box and the other end is provided with a plate for engagement with the chuck. The plate has a male register on one side for fitting into the center hole of the chuck body and the two are locked together by a bolt which passes through a hole in the plate and engages with a threaded hole in the chuck face.

The chuck can be stored on the hinge plate and swung around clear of the spindle so that it lies along the back of the headstock gear box. It can remain there when not in use.

All the attachments have been shown in use with lathe spindles having a quick-release taper mounting for chucks, but they can be used with screwed and flanged noses equally well. With screwed noses, it is advisable to loosen the hold of the threads, before applying the chuck handler. The spindle should be rotated at its slowest speed under power in the reverse direction, for complete disengagement of its thread from the chuck boss while the handling device is in position.

FAST uniform heating
...dialed to your exact need
CHROMALOX
Electric Far-Infrared



Isn't this the heat you need?

Fast . . . up to 75% faster than convection
Uniform . . . no over- or under-curing
Color-blind . . . absorbed almost equally by all colors
Clean—safe . . . no fumes, no flames, no glare
Accurately controlled . . . with infinite number of settings to match different jobs
Unbreakable, all-metal, maintenance-free
Easy and economical to put on the job

Chromalox Electric Far-Infrared is the answer

FREE BULLETINS for each type heater. Tell us your needs and we'll give you specific recommendations. Write today.

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CHROMALOX
FIRST NAME IN ELECTRIC HEAT

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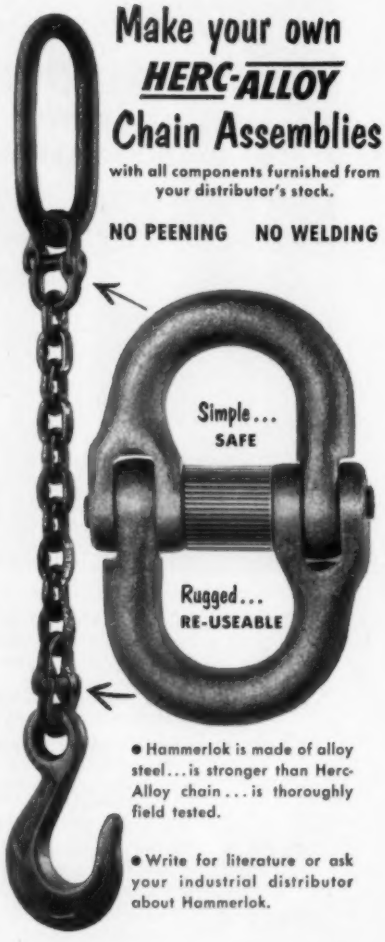
COUPLING LINK

Make your own *HERC-ALLOY* Chain Assemblies
with all components furnished from your distributor's stock.

NO PEENING NO WELDING



● Hammerlok is made of alloy steel... is stronger than Herc-Alloy chain... is thoroughly field tested.

● Write for literature or ask your industrial distributor about Hammerlok.

● *MADE BY* the makers of Herc-Alloy... the original alloy steel chain.

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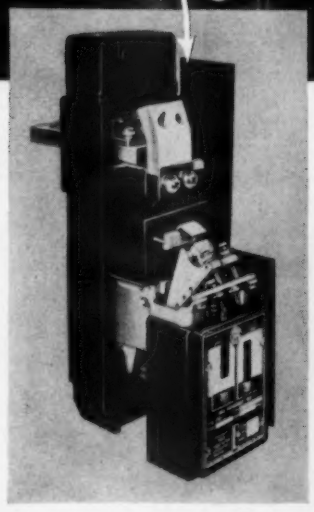
LOW VOLTAGE SWITCHGEAR



Here's SENSITIVE Circuit Protection

Some temporary overcurrents are tolerable; should even be permitted to occur. But sensitive circuit protection is needed to interrupt them when they persist too long or are of too high a magnitude.

The I-T-E Type OD-1 dual magnetic overcurrent trip device gives such protection. It permits temporary overcurrents, but limits them in duration and magnitude. This device will trip the circuit breaker after a predetermined interval on relatively low overcurrents or will trip instantaneously on high-magnitude fault currents. In either case you get safe, positive protection—sensitive to the needs of the circuit and the equipment on it.

For complete information on sensitive circuit protection, including selective tripping, undervoltage and other tripping devices, contact your local I-T-E sales representative. Or write for Bulletin 6004B. I-T-E Circuit Breaker Company, 19th & Hamilton Sts., Philadelphia 30, Pa.

Features of the I-T-E Type OD-1 Trip Device

PRECISION BUILT and factory calibrated to provide the highest possible accuracy in operation.

SEALED SILICONE TIMING ELEMENT. No maintenance. No oil to handle, no level to maintain, no sludging.

QUIET. Resonant vibration dampeners prevent a-c noise and wear on parts.

COMPLETELY ADJUSTABLE IN SERVICE. The delay pickup is easily adjusted from 80 to 160% of the continuous current rating. The instantaneous pickup is adjustable from 500 to 1500% of the continuous current rating. The time delay is adjustable to any of three time delay bands—minimum, intermediate and maximum.

SAFE DEAD FRONT DESIGN. Insulated knobs permit safe adjustment on a *hot* circuit breaker.

DEPENDABLE impact tripping action. The *hammer blow* movement of the time delay armature at end of timing stroke gives positive operation.

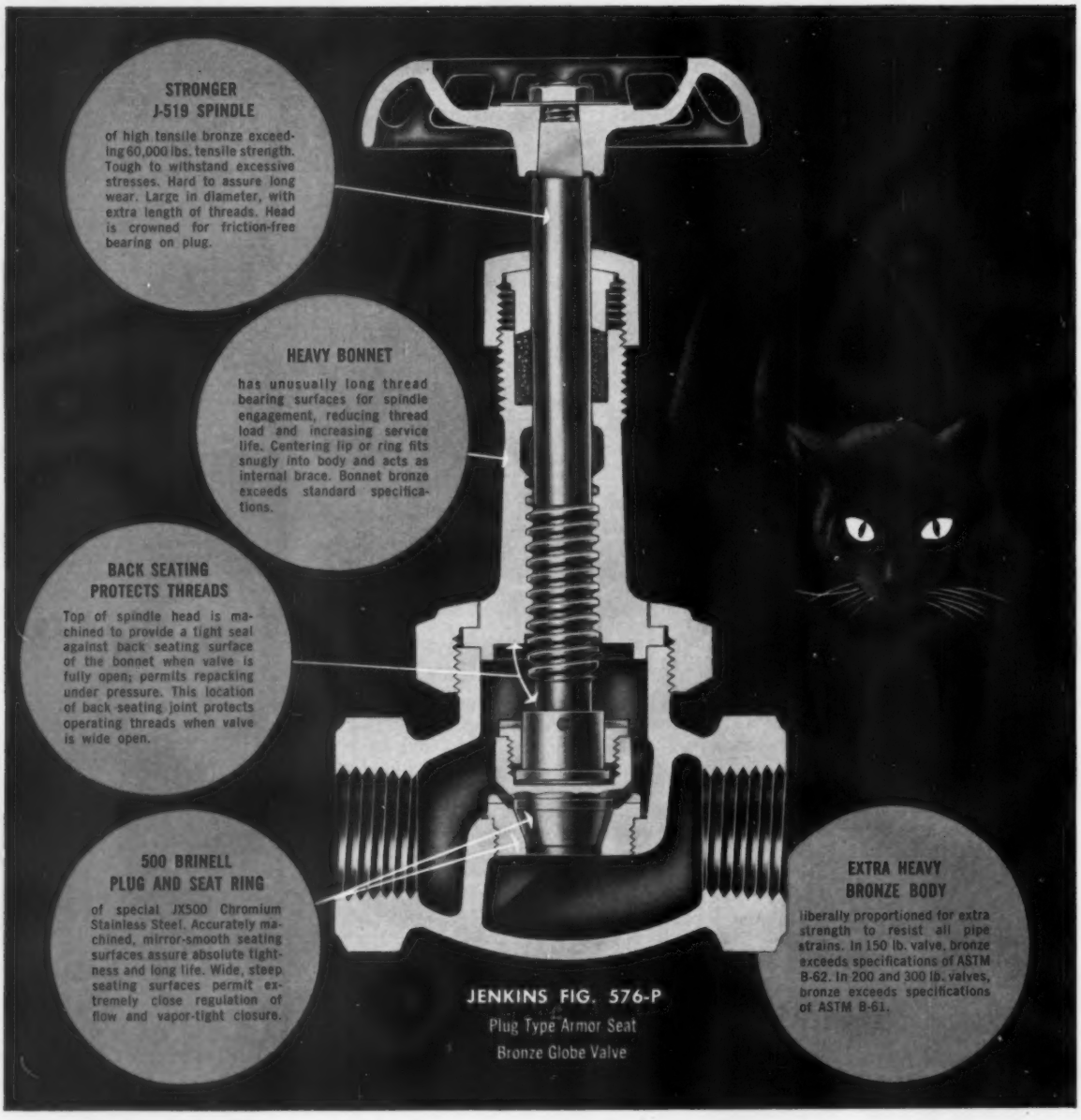
FAST RESETTING. Sensitive check valve on the piston provides quick resetting of the time delay. Repeat tripping is assured.

I-T-E CIRCUIT BREAKER COMPANY • Switchgear Division

IN CANADA: EASTERN POWER DEVICES, LTD.

For more facts circle 667 on Reply Card

Where valves need 9 lives...


STRONGER J-519 SPINDLE
of high tensile bronze exceeding 60,000 lbs. tensile strength. Tough to withstand excessive stresses. Hard to assure long wear. Large in diameter, with extra length of threads. Head is crowned for friction-free bearing on plug.
HEAVY BONNET
has unusually long thread bearing surfaces for spindle engagement, reducing thread load and increasing service life. Centering lip or ring fits snugly into body and acts as internal brace. Bonnet bronze exceeds standard specifications.
BACK SEATING PROTECTS THREADS
Top of spindle head is machined to provide a tight seal against back seating surface of the bonnet when valve is fully open; permits repacking under pressure. This location of back-seating joint protects operating threads when valve is wide open.
500 BRINELL PLUG AND SEAT RING
of special JX500 Chromium Stainless Steel. Accurately machined, mirror-smooth seating surfaces assure absolute tightness and long life. Wide, steep seating surfaces permit extremely close regulation of flow and vapor-tight closure.
EXTRA HEAVY BRONZE BODY
liberally proportioned for extra strength to resist all pipe strains. In 150 lb. valve, bronze exceeds specifications of ASTM B-62. In 200 and 300 lb. valves, bronze exceeds specifications of ASTM B-61.
JENKINS FIG. 576-P
Plug Type Armor Seat
Bronze Globe Valve

Install this JENKINS...made to defeat valve-killers

HERE are just five of the eighteen ways by which Jenkins Plug Type Valves have been engineered for maximum wear in valve-killing services. For any close-control steam service like drains, bypass lines, drips, blowoff, throttling, bleeders . . .

Or where abrasion, entrapped pipe chips, scale or rust tubercles are a problem . . .

You'll cut maintenance and replacement costs by specifying *"Jenkins Plug Type, with the 500 Brinell Stainless Steel Armor Seat"*. In the Jenkins Catalog are 150 lb., 200 lb. and 300 lb., Globe and Angle, screwed or flanged end valves in a full range of sizes. And, they are available quickly from local distributors' stocks.

WRITE us, or ask your Jenkins distributor for descriptive folder No. 202-A. Jenkins Bros., 100 Park Avenue, New York 17.

JENKINS VALVES

LOOK FOR THE JENKINS DIAMOND

SINCE 1864 TRADE MARK JENKINS

Sold Through Plumbing-Heating and Industrial Distributors

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BULLETINS

101	102	103	104	105	106	107	108	109
110	111	112	113	114	115	116	117	118
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BULLETINS

(Begins on page 21)

155 **Hose Couplings**—Bulletin 115, 8 pp, describes and illustrates heavy-duty high pressure hose couplings. Covers application in conveying high pressure air, steam, gas, hydraulic and liquid anywhere in construction, mining, petroleum and general industry. Capacity and size information also included. Le-Hi Div., Hose Accessories Co.

CONSTRUCTION

157 **Industrial Doors**—Catalog 57-ID, 20 pp, provides facts, figures and planning data on new developments in doors for piers, warehouses, and other industrial buildings. It features a guide to door type selection, designed to help solve entrance problems based on use, door type, dimensions, method of operation, operating pattern and advantages. Detailed descriptions of doors, illustrated with photos of installation and architectural details included. International Steel Co.

158 **Overhead Doors**—This 16-pp catalog gives full information on Weather-King panel doors, electric operators, radio controls, and special control designed for commercial and industrial applications. Specifications and instructions for preparing building openings and installation of various models are given with detail drawings. Solutions to special installation problems included. Barber-Colman Co.

159 **Revolving, Swing Doors** — Advantages and features of revolving doors and swing door entrances are cited in two new bulletins. The 20-pp revolving door catalog features the two-speed motorized door, and the 12 rpm maximum speed control. Photos, typical arrangements, floor plans are included, as well as charts and graphs illustrating design and architectural details. Twelve-pp Catalog S-157, illustrates typical swing door entrances, and gives architectural data on stainless steel and packaged entrances. Revolving Door Div., International Steel Co.

160 **Aluminum Windows**—This 12-pp illustrated booklet describes proper handling and installation of aluminum windows in a variety of building applications. Provides simplified instructions on aluminum window care. In addition to directions on handling, glazing, cleaning, loading and storage, the booklet gives detailed diagrams on installations for different openings, as well as tips for all types of windows—double hung, casement, awning, projected, and horizontal sliding. Aluminum Window Manufacturers Association.

161 **Modern Flooring**—Two catalogs, illustrated in full color, present information on company's floor products. One is on asphalt tile products, the other on vinylized tile. Both catalogs contain charts, photos of typical installations and full product data. Azrock Products Div., Uvalde Rock Asphalt Co.

162 **Why Non-Shrink Mortar**—How to get better results in 12 construction operations by using non-shrink mortar is discussed in Folder E-38. Operations are illustrated in building cross section view, and each is keyed to a short explanatory paragraph. They cover waterproofing walls, grouting machinery and anchor bolts, patching defects in concrete, setting floor brick, others. The Master Builders Co.

163 **Rubber Dock Bumpers**—This catalog sheet illustrates and describes company's line of Flex-O Rubber dock bumpers, designed to protect docks and trucks, reduce damage to fragile freight, and eliminate dock maintenance and prevent dock downtime, by absorbing impact of trucks backing into docks. Detailed specifications are included. Bumpers, Inc.

164 **Modern Elevated Tanks**—Described in this 16-pp brochure are the Watersphere and Waterspheroid, two modern elevated water storage tanks designed to provide gravity pressure for general service and fire protection. Several installations are illustrated. Use of such tanks for "skyline" advertising is also touched upon. Minimum ground area, utilization of base for storage and pumping equipment and other advantages of the tanks are detailed. Chicago Bridge and Iron Co.

FIXTURES, SUPPORTS

165 **Fixtures, Supplies**—This 8-pp illustrated catalog describes Globe fixtures used in installing plumbing, heating, air conditioning and sprinkler systems. Application and size data are provided. Products shown include steel inserts to hang overhead piping in concrete, split ring hangers, I-beam clamps and retaining rings, underground hanger clamps, steel ceiling plates, swivel hangers, escutcheon plates for sprinkler heads. Huppower Div., Hupp Corp.

166 **Tubing Support System**—Twelve-pp Bulletin 255 describes the Instrof system for support of instrument tubing. Stresses quick-joining and other advantages of a built-in-pin-type coupler with which major units of the system are equipped. Shows how flat bends, crosses, tees, and vertical bends are made. Miscellaneous fittings are also shown. Dimensional data and load-deflection curves are provided. Instrof Inc.

COOLING

168 **Refrigeration Unit**—Bulletin C-1100-B95 announces a hermetic centrifugal refrigeration unit, in 100- to 500-ton capacities, designed to meet any air conditioning installation requirement where chilled water is used. Gives information on component parts, features and specifications. Worthington Corp.

169 **Condensing Units**—Data Sheet 493, 8 pp, includes specifications and capacities for open type refrigeration and air conditioning condensing units from ¼ through 100 hp. In addition, specifications are included for compressor units for use with evaporative condensers, ½-100 hp. Simple compressors in single and two-stage for use with horsepower up to 100 are also included. Data and specifications are given for condensing units with Freon-12 or Freon-22 refrigerants. Brunner Mfg. Co.

170 **Heat Exchange Surface**—Advantages and applications of Thermo-Panel Coil—a plate coil heat exchange surface that takes the place of pipe coils in industrial heating and cooling processes—are described in Bulletin 257. Technical data are included. Dean Thermo-Panel Coil Div., Dean Products, Inc.

171 **For Generator Cooling**—Twelve-pp Bulletin 1200, on recent developments in coolers for generator windings, describes design and construction of G-R K-Fin coolers, finned tube units for both air and hydrogen circulated through the generator windings in a closed system. Application of each type of unit is shown and explained. Reference is made to applications of these coolers to air and gas cooling or heating services in chemical process, other plants. The Griscom-Russell Co.

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MAINTENANCE

178 **Industrial Maintenance Products**—This 6-pp catalog describes the Skyco line of industrial maintenance products. It covers 12 products, including No-Glare—the original factory window coating to reduce sun glare and heat—and Rust Tox, the protective coating for rusted metal which stops rust action and provides one-coat protection. The Skybryte Co.

179 **Cleaning Brushes**—Rota-Master brushes, designed primarily for cleaning of rubber or fabric conveyor belts, material spreading, dust removal and metal finishing when used with abrasive compounds, are described in this illustrated bulletin. Covers brush specifications, horsepower and machinery requirements and shows set-up method. The Osborn Mfg. Co.

METALS

180 **Some Stainless Types**—This 8-pp booklet contains detailed information on Types 308, 309 and 310 stainless steel, which have increased chromium and nickel content over Types 302 and 304. Gives data on physical properties, heat treatment, strength at high temperatures, fatigue strength, and resistance to oxygen. These steels are used in furnace parts, boiler baffles, oven linings, pump parts, etc. Allegheny Ludlum Steel Corp.

181 **Glass Protected Steel**—Bulletin MQ-101 presents factual data on glass protected steel—what it is, scope of its effective range, chemical and physical properties. Charts show its resistance to four common industrial acids. A. O. Smith Corp.

182 **Corrosion Resistant Metal**—Plant Engineers concerned with problems of corrosion and high temperature services will benefit from the technical data contained in Bulletins ASL No. 285 and ASL No. 286. ASL No. 285 offers information on company's Croloy 27-4-1 (Type 329) in tubular form, and ASL No. 286 furnishes data on Croloy 25-12 (Type 309S). Includes chemical analysis, size and range specifications, mechanical properties, welding characteristics. The Babcock & Wilcox Co.

Among This Month's Literature of Special Interest . . .

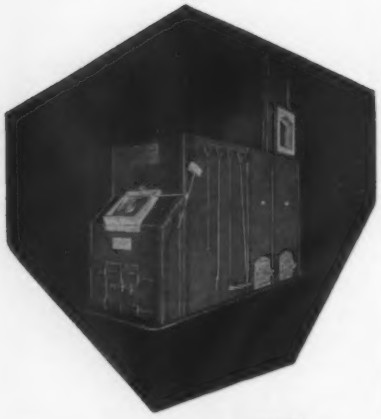
172 **Microfilm as Paperwork Tool**—"New Horizons with Microfilm," 36 pp, tells of conception and growth of the Filmsort system for activating microfilm by mounting it in aperture cards or jackets; gives details of new equipment and techniques for handling engineering drawings, office records, and traffic control material. Filmsort Div., Dexter Folder Co.

173 **For Blast Cleaning**—Automated techniques for high speed blast cleaning, construction features of Rotoblast units, layout aids, and a special section on abrasive coverage are presented in 20-pp Bulletin 703. Complete specifications and dimensions for units, from 1½ cf to the 27 cf size, are included. Dimensional plan views and silhouette drawings are given as well as the maximum weight per piece for cleaning maximum weight per load, and motor specifications. A comprehensive chart illustrates various types of automation operations adaptable to high-speed cleaning applications. Pangborn Corp.

174 **Rotary Seal Data**—Plant engineers concerned with process equipment will find it easy to select the right type of mechanical seal for a specific operating condition with Form 480, a 16-pp catalog on rotary mechanical seals. It is extensively illustrated with cutaway views showing stuffing box installation details. Each seal is attended by a quick reference covering temperatures, pressures and fluids it is designed to serve. Durametallic Corp.

175 Propeller Fans—Pictorial Bulletin FM-2345, 24 pp, describes design and fabrication of heavy-duty propeller fans and related package units. Covers various types of power roof ventilators, water coolers, heat pump installations, dual service condenser, and evaporator packages, fan assemblies for dry coil condensers, air washer and scrubber installations, stainless steel equipment for corrosive conditions, and others. Sizes, capacities and construction data included. Buffalo Forge Co.

176 **Distribution Substation**—Seven publications which comprise a Unit Substation Silver Anniversary Technical Library are available to qualified plant engineers. The publications are: "Distribution Substations in System Planning," GER-1151; "Economical Size Substations for 12-KV Distribution," GER-1299; "Converting a Radial to a Primary Network Distribution System," GER-1313; "Master Unit Substations and Their Relay and Control Arrangements," GET-2528; "Integrating Substation and System Planning Requirements to Reduce Over-all System Investment," GET-2677; "Twenty-Five Years of Progress in Unit Substations," GEZ-1865, and "Use of Hand books for Substation Planning Purposes," GEZ-1867. Complete details of distribution systems are presented, along with engineering data, photos. General Electric Co.



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BULLETINS

(Begins on page 21)

183 **Corrosion Keys for Aluminum**—This brochure is intended primarily as an aid to engineers designing aluminum into process plants or equipment, although it will interest those with other applications of the metal. It makes use of graphs which tell at a glance the yearly corrosion rate of more than 100 chemicals and other corrosive materials on aluminum. The Reynolds Metals Co.

LUBRICATION

184 **Valve Lubricant**—Bulletin V-220, 12 pp, provides detailed lubricant selection data, including information about 80 new lubricants. Discusses such topics as functions of a lubricant, forms and types of lubricants, and methods of lubricating. Characteristics of various types of lubricants are tabulated on a chart, and lubrication equipment is described. Meter and Valve Div., Rockwell Mfg. Co.

185 **Improved Lube Fittings**—Bulletin BU-61 describes and illustrates advantages of a special relief-type lubrication fitting which can be attached to bearing housings of motors, machines or pillow blocks equipped with conventional relief plugs. Photos and drawings show how fitting saves time, helps prevent over-lubrication. Keystone Lubricating Co.

OTHER EQUIPMENT

186 **Strapping Tape**—Form 74-52, 8 pp, describes use and advantages of company's 250-lb tensile strength strapping tape for packaging, package reinforcing, bundling, palletizing, unitizing and tear stripping. Complete with illustrations, technical data, performance specifications, plus descriptive text, drawings and photos, the booklet provides practical information on tape applications. Johns-Manville.

187 **Work Clothing**—Catalog 101, 16 pp, is filled with illustrations and descriptions of uniforms and work clothing of every type. It contains a special section describing various clothing and uniforms designed for power and manufacturing plants. M. Setlow & Son, Inc.

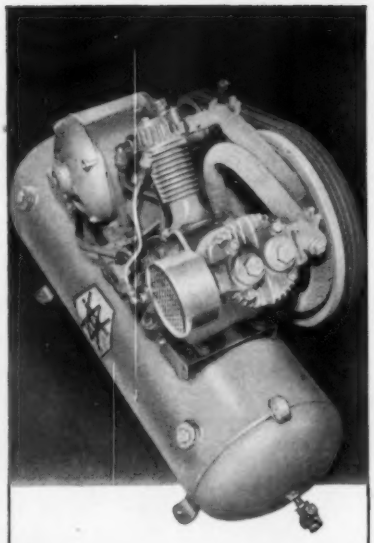
188 **Weather Engineering**—The role of modern weather sciences in solving problems of production, marketing and distribution as well as plant location and design is told in a 20-pp brochure, "Weather Engineering for Profit." Documented by actual case histories of weather service to many industries, it discusses growth of industrial weather services and type of engineering studies, interpretive forecasting and weather modification service provided by the company. Weather Corp. of America.

189 **For Product Reduction — Sixteen-pp** Catalog 907 pictures and describes rigid hammer type shredders, grinders, hashers for reducing cork, pulp laps, wood chunks, rubber, citrus fruits, animal waste. Includes installation photos, details of construction and operation, general specifications. The Jeffrey Mfg. Co.

190 **Hydraulic Equipment**—This catalog contains 60 pp of illustrated information on hundreds of surplus equipment and new items for industrial use. Also includes pages on the application and installation of hydraulic power. Ideas on modernization of equipment are plentiful, and a variety of bargains in newly manufactured and surplus generators, hydraulics, motors, pumps, valves, transformers, cylinders, and others is included. The Groban Supply Co.

191 **Epoxy Resin Systems**—This summary chart outlines physical and electrical properties of epoxy resin systems, listing 25 systems and basic properties of each. Information on the chart includes average pot life of resin in a 100 gram mass at 80 F, viscosity in centipoises at –80 F before and after addition of hardener, physical properties of cured samples at 80 to 85 F, volume resistivity. Permacel Tape Corp.

192 **Insulating Oil Purifiers**—Bulletin 10-107 describes company's centrifugal insulating oil purifiers designed to keep insulating oil free of water and sediment. Tells how these purifiers work and gives complete dimensions, capacities and specifications on the various types and models. Also shown are photos of actual installations. The De Laval Separator Co.



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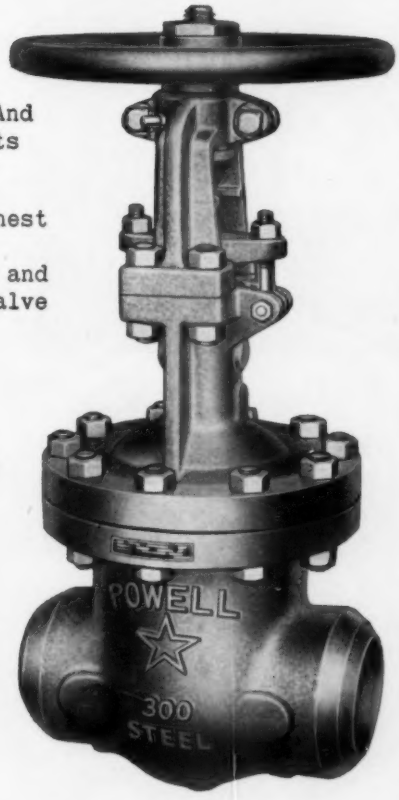

FIG. 3003WE -- Steel O.S. and Y. Gate Valve for 300 Pounds W.S.P.

FIG. 1561WE -- 150-Pound Steel Swing Check Valve

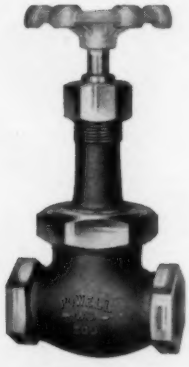

FIG. 2608 -- Bronze "W.S." Full Flow Globe Valve for 200 Pounds W.P.

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 247-248.

MATERIALS HANDLING

301 Electric Hoists—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conducting systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

302 Overhead Cranes—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Electrical information included. Chicago Tramrail Corp.

303 For Overhead Handling — Booklet 2008-M, 12 pp, is replete with illustrative material on principal components of overhead handling systems. Track design and advantages of supporting it flexibly are described, and formulas and figures for comparing various track sections are included. Among subjects covered are various carriers for hand, electric and automatic operation; tractors; track switches; standard cranes, transfer cranes and gantry cranes; safety electrification; buckets and grabs. Cleveland-Tramrail Div., The Cleveland Crane & Engineering Co.

304 Transit Crane—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.

305 Overhead Dispatch System — Form F 192, 8 pp, describes an automatic overhead dispatch system designed to solve a variety of materials handling problems. Outstanding advantages are listed and typical installations are described and illustrated with detailed diagrams. Component equipment utilized in this system is individually illustrated and described. Richards-Wilcox Mfg. Co.

306 Standard, Special Conveyors—Catalog 400, 20 pp, describes standard and special conveyors for a variety of materials handling applications in industry. Photos of typical installations illustrate roller conveyors, wheel conveyors, live roller conveyors, belt conveyor, pusher bar conveyor, elevating equipment, overhead cable trolley, overhead chain trolley, special handling equipment, slat conveyor, drag chain conveyor, bulk handling equipment. The E. W. Buschman Co.

307 Engineered Conveyor Systems—Catalog 835, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyer Co.

308 Steel Conveyor Belts — "A profitable approach to the selection of steel processing conveyor belts" is the subject of this 16-pp bulletin. Simplified selection, standard specifications, and installation information are included. Photos and diagrams illustrate the text. The Colorado Fuel and Iron Corp.

309 Lift Truck Work Kit—A method of predetermining the time necessary for fork-lift trucks to perform specific operations is provided in this work kit, designed to enable plant engineers to apply fork lift truck standard performance data. It can assist in determining efficiency of fork lift trucks now in use as well as in planning for future needs. Includes typical materials handling examples to show technique for application of the data, as well as charts providing times for basic truck motion elements. The Yale & Towne Mfg. Co.

310 Load Handling Equipment — Bulletin 406, 24 pp, covers company's Budgit, Tugit and Load Lifter products and other load handling specialties. Catalog numbers, sizes and specifications are tabulated, and application photos of the various products are included. Complete specifications and principal dimensions are indicated on tables. Manning, Maxwell & Moore, Inc.

311 Oil-Hydraulic Lifts — Catalog RE-203, 20 pp, covers the field of heavy-duty oil-hydraulic lifting devices for industrial applications. Featured in catalog are company's standard Levelator lifts, a 6000 lb single-jack model and a 12,000 lb dual-jack lift. Also featured is an electric pump mounted on an oil tank for powering oil-hydraulic devices. Illustrates lift platforms, platform accessories and safety devices, jacks, power units. Rotary Lift Co.

312 Electric Fork Trucks—Two electric fork trucks designed for high maneuverability, ease of maintenance, and operator comfort and convenience are introduced in two 6-pp bulletins. Bulletin 1324 covers a 4000-lb capacity model; Bulletin 1325, a 6000-lb truck. Performance, specifications, dimensions, details on controls and construction are given, features explained, and attachments shown. Baker-Raulang Co.

313 Automatic Ramp — Power-operated, automatic-leveling dock ramps for either air-oil (air compressor) or electric operation are described in this 6-pp bulletin. Design and construction features are illustrated, and specifications are included. Globe Hoist Co.

314 Adjustable Ramps—Engineering details and other information on use and installation of company's hydraulic adjustable ramps for loading docks are featured in this illustrated bulletin. Two types of dock equipment are treated—the Adjust-A-Dock, installed in the loading platform or at its level, and the Adjust-A-Truck, installed at ground level to raise or lower rear wheels of truck. Rowe Methods, Inc.

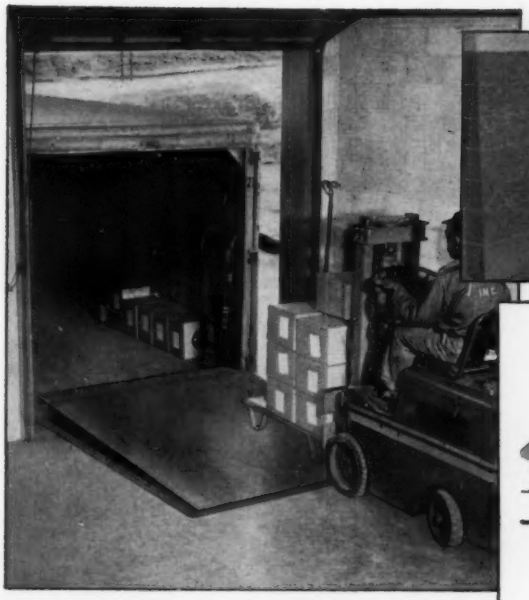
315 Automatic Dockboards—Bulletin D-160 describes company's automatic dockboards for fast, safe, mechanized materials handling. Features of the dockboards are illustrated and described, and general specifications included. Bulletin 181 covers specifications and layout for recessed models and package units. The Kelley Co., Inc.

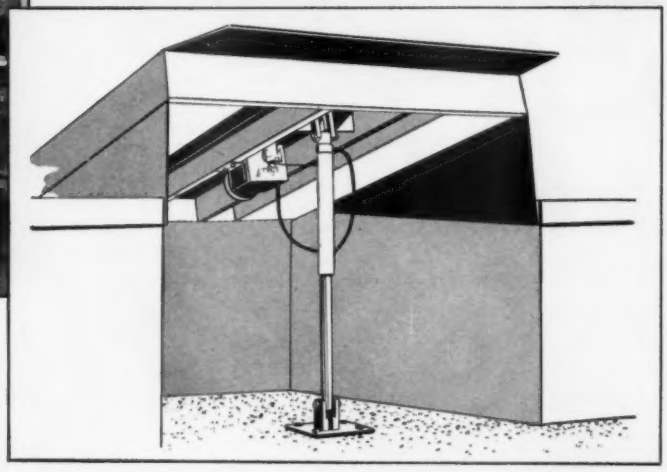
316 Electric Freight Elevator—Bulletin A-414, 12 pp, contains design and operation information on company's plunger electric freight elevator designed for low-rise, light and heavy duty freight handling requirements. A sectional diagram points out component parts, and an installation diagram and size and capacity table are included. Otis Elevator Co.

317 Hydraulic Jacks, Pullers—Bulletin Hydraulic-56, 16 pp, features company's line of hydraulic jacks and pullers. Prepared as an application guide for using various high-pressure jacking and pulling tools, it contains full descriptions, mechanical specifications and size charts, as well as illustrations of equipment in use. Templeton, Kenly & Co.

318 Sheet Lifter — Operational and design features of company's sheet lifting equipment, which contribute toward efficient handling, flexibility and economy are explained in Bulletin S-25, 16 pp. Cullen-Friestedt Co.

319 Self-Dumping Hoppers—Bulletin 250 describes self-dumping hoppers reported to cut cost of hand unloading at least 50 per cent. Details rugged construction of the units, safety catch incorporated, other features. Standard models are pictured, as are some typical jobs handled. Roura Iron Works.





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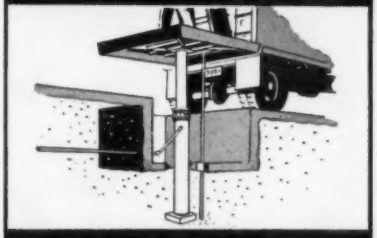
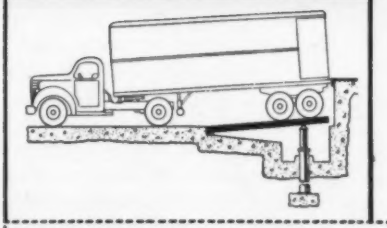


GLOBE TRUCK LEVELER



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(Begins on page 252)

320 Handling Baskets — Bulletin B-54 describes company's complete line of standard and custom-engineered Eezy-Stak parts handling baskets, for machinery, washing, plating. Wire & Iron Products, Inc.

321 Shock Absorbing Casters — Twenty-pp Catalog FH-53 describes construction features of company's Floating-Hub casters, listing types and mountings now available. Load ratings for each type and size are provided. Stresses, by text and illustration, how these shock absorbing casters work, permit smooth travel over rough floors. The Bassick Co.

322 Industrial Casters — Various types of casters for industrial applications are pictured and described in this large chart designed for wall mounting. Covers light duty, light-medium duty, medium duty, medium-heavy duty, heavy duty, extra heavy duty, trailer series, and special duty casters, and includes complete selection tables. Faultless Caster Corp.

SLINGS, CHAINS, WIRE ROPE

323 Industrial Wire Rope — Bulletin DH-128D, 24 pp, features wire rope recommendations for industrial services. Covers more than 120 types of wire ropes used in construction, conveyors, cranes, dredges, steel mill and blast furnaces, coal bridges, guy ropes, inclines, platform lift trucks and winch lines. Each recommendation covers such points as rope diameters, construction, preforming, lay, grade and core. In addition, charts covering weights and breaking strengths are provided. American Cable Div., American Chain & Cable Co., Inc.

324 Sling Chain Handbook—Illustrated Data Book 100, 32 pp, presents "how to do it" information on sling chains—from ordering to care, use and inspection. Contains diagrams, charts and tables on standard and special styles of sling chains and attachments, and their sizes, weights and working load limits under many conditions. Columbus McKinnon Chain Corp.

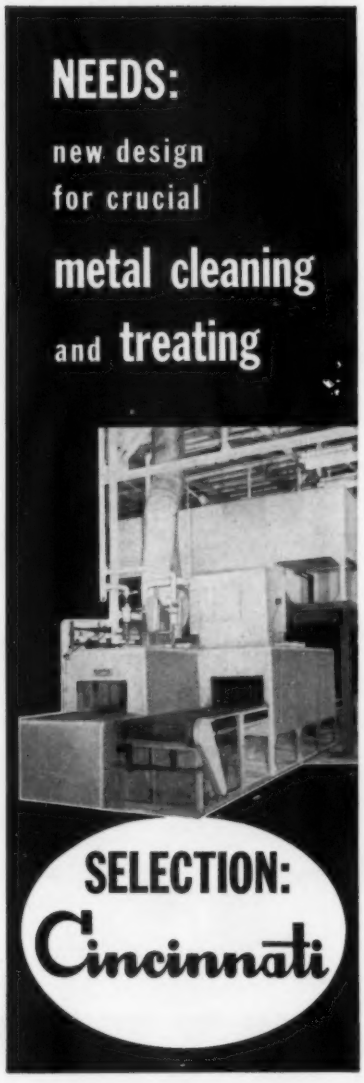
325 Sling Handbook — The 64-pp Tuffy Sling Handbook is replete with illustrations, charts and diagrams describing 16 factory fitted slings and nearly two dozen standard fittings available for slings, including several which are recent additions to the line. Book contains a complete rigger's manual, shop chart of ratings, an engineer's notebook and standard signals for directing operations of overhead traveling cranes and derricks and locomotives. A new development featured is the steel ferrule splice now on all Tuffy slings, which affords safety and other advantages. Union Wire Rope Corp.

MECHANICAL POWER TRANSMISSION

326 Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum bore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

327 Sprockets and Chain — Bulletin A-624 24 pp, is compiled to provide plant engineers with all data required for selecting and ordering roller chain and sprockets. Devotes a page to Taper-Lock sprockets for each size of chain from 40 to 100, giving sectional drawing, dimensions, number of teeth, maximum stock bore available, weights, prices and other data. Another page covers Taper-Lock bushings; and full information is given on riveted and cotter-type roller chains. Dodge Mfg. Corp.

328 Helical Gear Drives—A new line of in-line helical gear drives is described in 16-pp Book 2651. Load classes for over 250 applications, overhung load ratings and dimension tables, instructions for proper selection and cut-away views of both double and triple reduction drives are given. Link-Belt Co.



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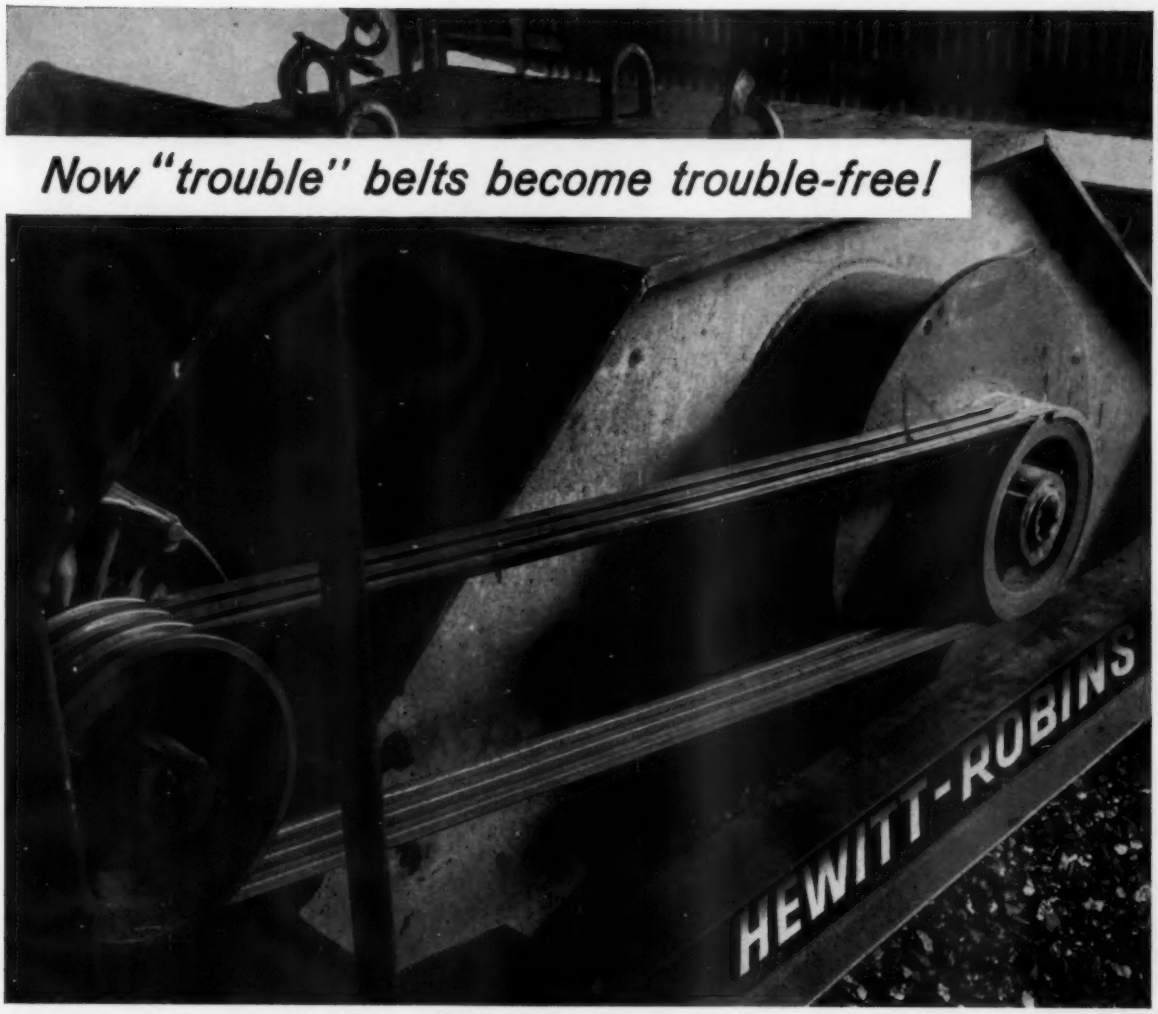

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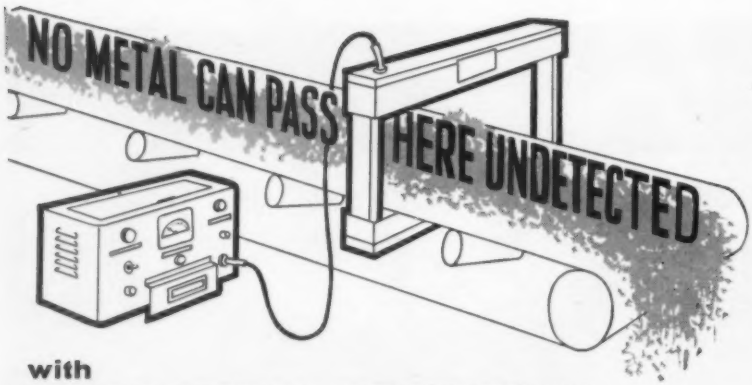

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(Begins on page 252)

329 **Fluid Drive** — Eight-pp Bulletin 9819 describes and illustrates adjustable speed Gyrol fluid drives, 1- through 25-hp, giving advantages and applications. Components and operation are covered in detail and selection tables are provided for direct connected and V-belt types. American Blower Corp.

330 **Spacer Coupling** — Of special interest to plant engineers concerned with operation of many pumps is Manual 4838 on this company's Type F Steelflex spacer coupling which has a quick-disconnect feature. Step-by-step illustrations show how to install, remove coupling and lubricate it during assembly. Process pump selections are tabulated, dimensional data included. The Falk Corp.

331 **Power Transmission Equipment**—Form 1200, 12 pp, describes a full line of conservatively rated equipment for various power transmission requirements, including flexible couplings, variable speed pulleys, variable speed belts and sheaves, variable speed transmissions, motor bases, and universal joints. Dimensional and capacity data are tabulated. Lovejoy Flexible Coupling Co.

332 **Adjustable V-Belt** — This 8-pp catalog covers company's Veelos TD and TE V-belt designed to reduce installation and operation costs on big drives. Studs, cup-washers and T-screws of the belt are illustrated, and installation and operation characteristics explained. Booklet includes directions on how to measure, to couple and uncouple, and to install the belts. Manheim Mfg. & Belting Co.

333 **Flexible Couplings**—Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings for power transmission. Tells advantages of these couplings and discusses design principles. Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

FILTERING

335 **Filters, Strainers** — Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of microfilters and precision strainers. Fuel filters, full flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

336 **Filter Fabric Facts** — This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fabrics for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Wellington Sears Co.

PUMPS, COMPRESSORS

338 **General Purpose Pumps**—Section B, 36 pp, describes rotary pumps for general purpose use. Explains positive displacement principle incorporated, gives suggestions for selecting proper materials of construction. Application and ordering information is provided on mounted and unmounted small pumps, large mounted pumps, pumps for operations requiring greater sealing, and large, totally enclosed models. An engineering section covers recommended speeds and capacities. Viking Pump Co.

339 **Continuous Flow Pump**—Bulletin 30-C, 8 pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

340 **For Abusive Pumping Jobs** — Catalog 4906, 36 pp, covers centrifugal pumps for wide industrial use and especially adapted to handling ashes, abrasive mixtures, slurries, hot and corrosive liquids. It describes several basic types; a horizontal shaft, single-stage side suction pump; a horizontal shaft, single-stage,

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.... bar soap wastefully dissolving on the shower room floor?
.... liquid soap dispensers either dripping or all clogged up?
.... constant work keeping dispensers filled and in order?
.... complaints about your soap from both men and women?
.... whatever your soap "headache", SBS-60 can help.

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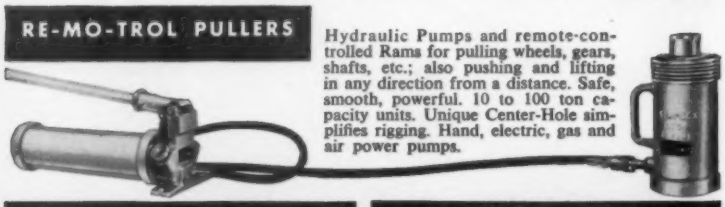

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Self-Dumping Hopper increases plant efficiency

Handling costs have been cut sharply and plant efficiency has been increased for Henning Brothers & Smith, metals refiners, Brooklyn, N. Y. Bulk materials handling is now standardized by using nine Roura Self-Dumping Hoppers—doing several different jobs throughout their plant. These maintenance-free Hoppers, attached in 3 seconds to any standard lift truck, dump aluminum scrap into furnaces, move 400-600° zinc ingots to a storage area, and are loaded with hot brass ingots from a conveyor belt. In each job, the entire operation is handled by one man. He just flips the latch and the Hopper dumps itself, rights itself, and locks itself.

Why not let Roura Self-Dumping Hoppers cut costs and save time for you, handling hot or cold, wet or dry bulky materials.

ROURA *Self-Dumping* **HOPPER**

WANT MORE DETAILS? Attach this coupon to your letterhead and mail to

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DATA FILE

(Begins on page 252)

rear-entrance automatic priming pump; vertical shaft pumps with standard, overhead and quill bearings for wet pit applications. Nagle Pumps.

341 **Circulating Pump**—Bulletin 1A-856 details seven advantages of company's Booster circulating pumps, and includes complete design and performance information. A capacity chart and specifications included. Bell & Gossett Co.

342 **Solids Handling**—Bulletin 121-A, 8 pp, describes non-clog pumps for handling solids in suspension. Included are vertical, horizontal and close-coupled types used to handle liquid components of industrial processes, industrial waste, and for such pumping applications as water supply, drainage and sewage handling. Specifications are included. Aurora Pump Div., The New York Air Brake Co.

343 **Industrial Compressors**—Bulletin SSB-56 covers company's complete line of industrial air compressors from the 1/2 hp to 150 hp, including the accessories that go to make a complete installation. Photos of the various models are included, as well as specifications and dimensions. Schramm, Inc.

344 **Air Compressors**—Bulletin A-62, 20 pp, covers construction, operation information on company's class WN-112 heavy-duty air compressors. Illustrates five models of compressor, for displacement capacities from 368 to 974 cfm at sea level, and four high altitude models for 532 to 1100 cfm. Joy Mfg. Co.

345 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines. Le Roi Div., Westinghouse Air Brake Co.

346 **Gas-Engine Driven Compressors** — A two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features are discussed. Clark Bros. Co.

347 **Compressor Data**—Feather valve compressors from 75 to 350 hp are described in 32-pp Bulletin L-676-B1A. Advantages on installation, operation and maintenance costs are outlined for types YC and DYC compressors. Information and illustrations are offered on component parts, including frame, running gear parts, intercooler, crosshead, motor and main bearings and various cut-away views are included. Variable capacity control information is listed along with data on governors. Diagram illustrates correct selection and coordination of auxiliary equipment. Worthington Corp.

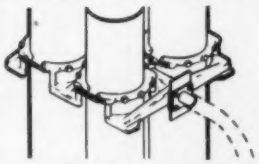
348 **Air Cooled Compressors**—Bulletin AC-15, 16 pp, shows a complete line of small, air-cooled compressors for industrial, and other use. Both one- and two-stage compressors are covered, with working pressures ranging from 85 to 175 psi. Complete specifications for each model are given and two charts—one for figuring compressor needs and another showing estimated air consumption for 30 common shop jobs—are printed. Gardner-Denver Co.

INSTRUMENTS, CONTROLS

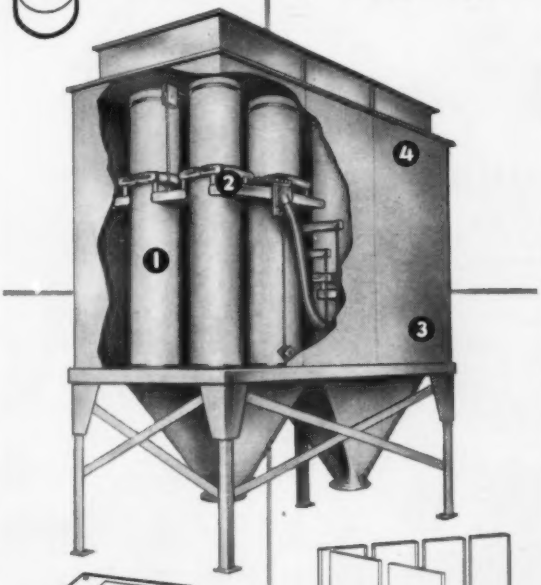
349 **Temperature Controls** — Eight-pp Catalog CC, on temperature controls and allied equipment for heating and refrigeration, provides information on recording, indicating, non-indicating controls; thermometers; bulb installation accessories; process timers, and gas pilots. Includes prices and references to detailed literature. The Partlow Corp.

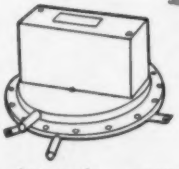
350 **Versatile Electronics** — How flexibility of electronic temperature controls makes them useful in a wide range of heating and air conditioning installations is explained in this 16-pp booklet, Bulletin SA-2681. Purpose of publication is to fill the gap between the theory of electronic bridge circuits and specific control layouts and circuit diagrams. Four basic features that give electronic control its flexi-

1 Uniformly dense felt filter bags... of wool or synthetics...produce maximum filtering efficiency yet have 6 times flow rate of ordinary woven filter material. Tiny pores catch and hold even sub-micron-sized particles. Bags measure 12" in diameter... up to 18' in length.

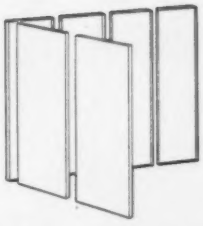


2 Exclusive reverse-air-jet action cleans entire bag area uniformly and automatically. Blow rings* travel up and down length of bag exterior . . . blowing through bag to remove accumulated dust from bag walls. Automatic cleaning never interrupts peak filtering efficiency.





3 Automatic pressure switch* eliminates overcleaning . . . prolongs bag life. Switch controls blow ring operation. Above normal pressure loss actuates rings which stop when pressure loss normalizes. Automatic self-cleaning occurs as often or as seldom as needed.



4 Prefabricated Aeroturn can be installed in one-quarter the time required by ordinary dust collectors of similar capacity . . . in half the space. Aeroturn arrives from the factory in easy-to-assemble prefabricated sections.

50% LOWER MAINTENANCE COSTS and 99.9%+ EFFICIENCY

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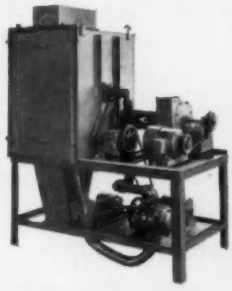
Up To 75% Lower Installation Costs . . . Up to 50% Less Space! You can get rid of dollar-consuming dust far more economically with a Koppers Series 12 Aeroturn than with a conventional collector. The Aeroturn Dust Collector costs you less to install and maintain . . . occupies far less space. A Koppers Series 12 Aeroturn operates continuously and automatically at highest filtering efficiency.

Aeroturn's remarkably high filtering efficiency sends your plant and machinery maintenance costs way down. Your heating and cooling costs fall because you can recirculate air . . . cleaner than outside air. Koppers Series 12 Aeroturn Dust Collector is available with from 4 to 64 filter bags . . . Aeroturn's capacities range from 1,000 to 60,000 CFM. It only takes a few minutes of your time to discover for yourself the many cost-saving features of the Koppers Series 12 Aeroturn.



Factory-assembled and test-operated, Koppers Model D Aeroturn Dust Collector combines features of Series 12 with unusual compactness. Capacities range from 500 to 4,800 CFM.

AEROTURN DUST COLLECTORS

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DATA FILE

(Begins on page 252)

bility and broad application are described. Minneapolis-Honeywell Regulator Co.

351 Service Regulators — Revised Bulletin 1026, 20 pp, features company's line of service regulators. Rate-of-flow graphs illustrate mathematically the determination of maximum outlet pressure build-up and amount of gas relieved to atmosphere by extra safety device in case of failure of regulator. Rockwell Mfg. Co.

352 For Industrial Metering—Practical selection and application data on meters for industrial liquids are provided in 20-pp Form 566. Explains value of metering in batch mixing, process and cost control. Illustrated charts show how to select the proper meter according to type, temperature and flow rate of liquid to be metered, and include specifications for models shown. Strainers, valves and other accessories are described. Neptune Meter Co.

353 Thermostatic Shower Control—Safety advantages of the Hydroguard thermostatic controls for showers are outlined in illustrated Bulletin 366. Design and construction details are shown, capacity, and applications in industrial plants and institutions cited. The Powers Regulator Co.

354 Gages, Needle Valves — Catalog 76-G consists of a loose-leaf bound collection of literature on gages and needle valves. Various types of gages are illustrated and described, with applications and specifications fully detailed. A section on accessories is included, as well as one on specification, covering gage dimensions, dimensional diagrams, dial graduations, and other data. Needle valves for fine regulation of fluids are also described. Jas. P. Marsh Corp.

355 Combustion Controls—Included in this catalog (about 16 pp) are product descriptions

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Better PIPE TOOLS

CHAIN TONGS

"Reversible," "Standard" and "Ideal" types in all sizes. Jaws are drop forged from special steel, are carefully milled, heat treated, hardened and tested. The Handles are forged spring steel. The Chains are proof-tested to ⅔ catalog strength (1,200 lb. to 40,000 lb.). "Reversible" Jaws give double jaw life. "Standard" Jaws have extra bearing on the handle and forged-in chain guides. The "Ideal" Tongs have V shaped teeth for a sure grip on irregular shapes—fittings, etc.

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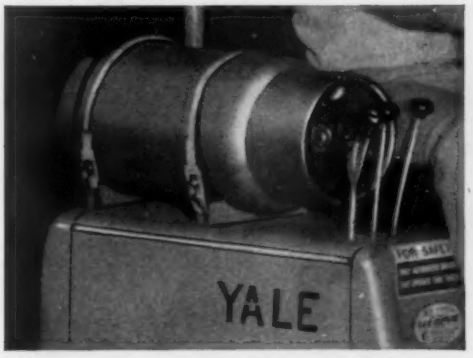
Yale LP-Gas Trucks have been awarded the Underwriters' Laboratories and Factory Mutual approval—your assurance of maximum safety when you must move materials in enclosed areas. Yale LP-Gas Trucks produce no harmful fumes, thus can operate in warehouses, crammed storage rooms or deepfreezes with complete safety for driver as well as odor-absorbing materials. Furthermore, the fuel system of Yale LP-Gas Trucks is completely sealed to eliminate danger from leaks or evaporation... fuel supply is shut off when ignition is turned off.

Yale LP-Gas Trucks are also exceptionally economical to operate because you can save up to 7 cents a gallon when you buy and store LP-gas in bulk. Engine stays cleaner, requires less maintenance...downtime is cut by as much as 50%. Yale LP-Gas Trucks are available in capacities from 2,000 to 10,000 lbs. For full facts, write The Yale & Towne Mfg. Co., Phila. 15, Pa. Dept. A-474.

New Yale LP-Gas Conversion Kit—the first with U.L. listing—now permits YOU to convert Yale Gas Trucks you already own into LP-Gas Trucks—and get complete safety approval from local inspectors and authorities. The kit includes all necessary parts and easy-to-follow instructions for proper installation.



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Gasoline, Electric & LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Hand and Electric Hoists

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DATA FILE

(Begins on page 252)

of company's combustion instruments and controls. Covers damper controls; drive units; draft, air pressure and flue temperature gages; steam controls; panel board cabinets; low-draft cut-off switches. Pages are fully illustrated to show design and operational details, and brief text includes application suggestions, special features. Cleveland Fuel Equipment Co.

LUBRICATION

356 **For Better Lubrication**—Advantages of company's lubricants which are specially compounded for lubrication of reduction gear drives are outlined in pocket-sized folder. Features which assure smooth, trouble-free gear drive performance and lower maintenance costs are listed. Gulf Oil Corp.

357 **Detergent Oils**—How to clean sludge out of hydraulic and lubrication system without shutting down machines is told in Technical Bulletin 44. Also tells how continued use of these highly detergent oils keeps equipment as clean as new. Sun Oil Co.

358 **Multi-Purpose Grease**—This bulletin describes Gargoyle Grease BRB No. 1, intended to provide correct lubrication for practically all normally loaded anti-friction and plain bearings. Tells how it resists leakage, affords protection. Socony Mobil Oil Co., Inc.

359 **Lubricant Data Book**—The 16-pp current edition of this company's popular Lubriplate Data Book offers practical information on lubrication of machinery. Gives product data on grease type and fluid products, hydraulic oil, compressor oil, motor oil. Suggestions on applying lubricants under normal and special conditions are provided. Several pages are devoted to lubricant recommendations for equipment used in a variety of industries—bottling plants, chemical and food processing, metalworking, iron and steel plants, textile plants, woodworking, pulp and paper machinery. Lubriplate Div., Fiske Bros. Refining Co.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

360 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

361 **Portable Electric Tools**—This standard catalog, Form 10, 24 pp, features portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners and others. Photos included. The Black & Decker Mfg. Co.

362 **Pipe Tool Ordering Guide**—Catalog 2-51, 8 pp, covers company's line of threaders, cutters, vises, dies, tongs and wrenches; gives prices. Armstrong Bros. Tool Co.

364 **Pipe Tools**—Ordering and application information on Ridgid pipe tools is provided in 16-pp illustrated Catalog 7596R-5. Wrenches, cutters, threaders, reamers, vises, and others are pictured and described, also power drives, pipe and bolt threading machines, oilers. Capacity, weight and price data included. The Ridge Tool Co.

365 **On Spot Welding**—"Spot Welding from One Side—With a Portable Gun," 12 pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

366 **Where to Use Your Stud Driver**—Twenty-pp pocket-size Form 955 describes and pictures applications of studs, using company's Model 450 stud driver. Provides some operating hints and safety precautions and covers use of studs through steel into concrete, wood into concrete, wood into steel and steel into steel, as well as their use for attachment of pre-drilled fixtures. Remington Arms Co., Inc.

VIBRATION CONTROL

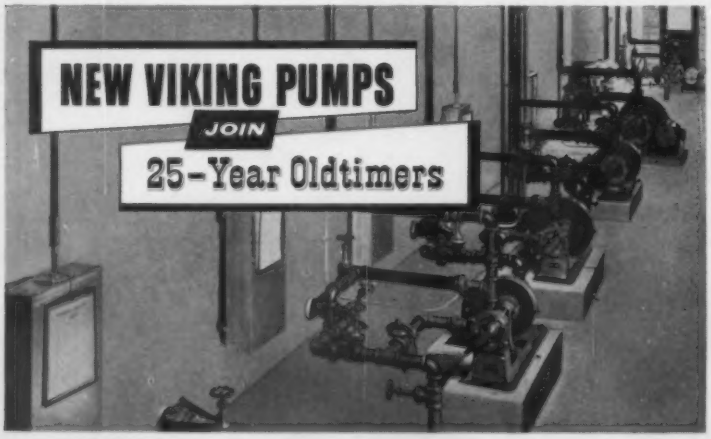
367 **Vinyl Machinery Mount**—Advantages of company's vinyl machinery mount are outlined in this illustrated brochure. Installations in a representative plant are shown. Clark, Cutler, McDermott Co.

368 **Vibration Control Specifications**—Bulletin F2B shows how to write vibration control specifications for all types of air conditioning and related equipment regardless of the operating conditions. Contains a definitive treatment of factors involved in selection of various isolation media, with particular attention to the influence of existing job conditions. A selector chart included. The Korfund Co., Inc.

369 **Improved Machine Mounts**—This brochure describes advantages of company's leveling machine mounts. Tells how they enable installation and leveling of heavy machines without bolting or shims, afford increased machine mobility, reduce maintenance costs, and lessen noise. Barry Controls, Inc.

MAINTENANCE

370 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvaniz-



This battery of Viking Pumps and Viking "Simplex" tank gauges is the newest installation in this all-Viking-equipped plant. For more than 25 years, the D-A Lubricant Company, Inc. of Indianapolis, Indiana has used Viking Pumps with complete satisfaction. They manufacture lubricants for heavy-duty equipment. As the business grew, new Vikings were added. Now D-A has completed a new compounding plant of 50,000 gallons per day capacity, and it's Viking-equipped exclusively. Experience has proved that Vikings are dependable, trouble-free and economical.

Let smooth, fast and positive delivery with Viking rotary pumps save money for you. Write for bulletin 57Sz today.

VIKING PUMP COMPANY Cedar Falls, Iowa, U.S.A.

In Canada, it's "ROTO-KING" pumps

THE ORIGINAL "GEAR-WITHIN-A-GEAR" ROTARY PUMP

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The University of Nevada at Reno, Nevada has openings on the teaching staff of the College of Engineering at the ranks of Instructor or Assistant Professor in Mechanical Engineering. Address Dean of Engineering for particulars.

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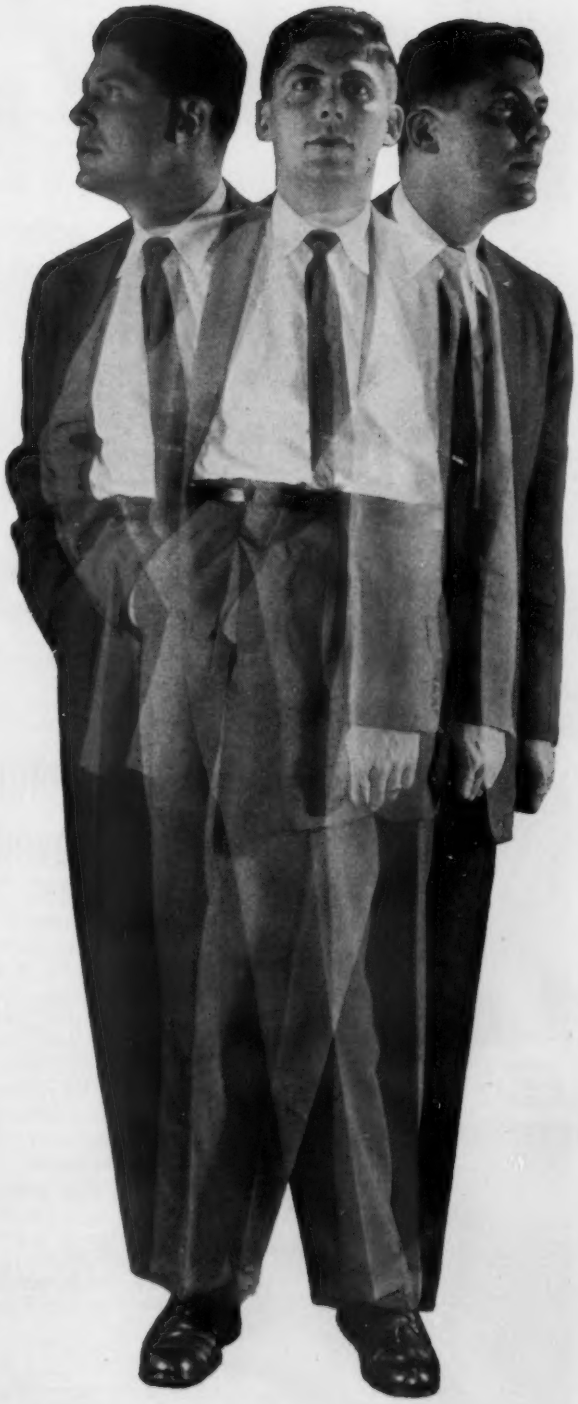
Don't overlook the special opportunity for engineers at Western Electric



When we say Western Electric offers you something special we're referring to the work we do, the status of the engineer in our company . . . and the unique chance this gives you to grow.

Fifty-five percent of the college graduates in our upper levels of management have engineering degrees. Moreover, we consider all our engineers part of management since they act for and plan in behalf of the company as a whole. They become *more* than engineers since they acquire knowledge of production, handling of people, accounting, merchandising, etc.

Engineers at Western Electric are key figures in our job of manufacturing, distributing and installing equipment needed for the nationwide network of 50 million Bell telephones. To keep pace with the constantly increasing demand for more and better telephone service, there's a constant need here for new products, new processes, new facilities . . . new ideas. Here transistors were first developed for production . . . here repeaters for the first transatlantic telephone cable were tailor-made.

Now – add to our telephone job the continuous flow of defense contracts we've had over the years . . . major projects like producing the Nike guided missile system, the DEW Line of radar stations. You can see why we've got a constant need to advance young engineers and scientists as fast as they measure up.

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DATA FILE

(Begins on page 252)

ing compares with other types of coatings as to rust resistance, dimension limits, shock resistance. American Hot-Dip Galvanizers Assn., Inc.

371 **Basic-Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roofing practices, essentials of a good re-roofing job. Johns-Manville.

372 **Protective Paint**—Thirty-five case histories of successful use of protective coatings based on chlorinated rubber are included in this 20-pp bulletin, "Protection With Parlon." Photos show water and sewage works, paper mills, storage tanks, and chemical and food processing plants where these coatings have had long-term exposure to corrosive environments. Hercules Powder Co.

373 **Paint Work Book**—Bulletin 760, about 12 pp, is a practical manual giving painting data in charts, tables, diagrams and illustrations. Factors relating to use of company's protective coatings in mild to severe corrosive service are covered. Coatings and related primers are presented, along with surface preparation, priming, application methods and maintenance instructions. Care and cleaning of brushes and spray equipment is explained. A table gives chemical resistance rating of each coating. The U. S. Stoneware Co.

374 **Guide to Coatings**—This 1957 Coatings Manual is a 32-pp treatise highlighting the stopping and preventing of rust on nearly all types of rustable metal. Illustrated in full color, this book contains information and recommendations to enable accurate determination of specific coatings needed for the job. Basic principle of Rust-Oleum's fish oil penetration into pores of metal is illustrated. Application photos give new ideas for protecting girders, tanks, boilers, roofs, other surfaces. Over 100 color chips show colors available in primers, short-oil and long-oil coatings. Galvinoleum, heat resistant, chemical resistant, and floor coatings are covered. Rust-Oleum Corp.

375 **Protective Coatings**—Corrosion control in the operating plant is the subject of this bulletin, which outlines several corrosion-resistant coatings systems for buildings and equipment, structural steel, towers and columns, tanks and piping. Properties and uses are given and basic requirements for control of corrosion are detailed. Bulletin also gives data on tank linings. Amercoat Corp.

Reader Service Cards for ordering catalogs are on pages 247-248. Be sure to include your name, job title, and company.

376 **Coatings for Insulation**—Manual 545, 20 pp, is a revised reference manual on adhesives, sealers, vapor barriers, surface coatings for use with insulation. Gives technical product data, application specifications. Includes handy reference chart covering 31 products, giving information on uses, application, and drying time. Benjamin Foster Co.

378 **Better Floor Care**—This illustrated folder describes products designed to aid efficient floor care. Lists combination Scrubber-Vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers and cleansers. Finnell Systems, Inc.

379 **Power Sweepers**—Models 605 and 606 power sweepers are described in Form 427-1255, which gives full specifications for each. Application photos show sweepers in operation and a cutaway view points out important features. Wayne Mfg. Co.

380 **Industrial Vacuum Cleaning**—Twelve-pp Bulletin 155 B describes both stationary vacuum cleaning equipment and portable industrial vacuum cleaners, the latter in both light- and heavy-duty types. Recent improvements in collection and dumping methods are covered, and photos show application to conveying, reclaiming, bench work and removal of water. Specifications and ratings are included. Spencer Turbine Co.

STORAGE EQUIPMENT

381 **Adjustable Shelving**—How this shelving can save assembly time is explained in 28-pp Form 2111. Photos and drawings of various types of shelving units, including open and closed shelving, bin units, ledge shelving, counter shelving, cabinets with swinging and sliding doors, parts and accessories are included. Standard Pressed Steel Co.

382 **Storage Equipment**—Catalog 100-E, 72 pp illustrates and describes company's complete line of steel cabinets, folding chairs, chests and safes, stools, tool boxes, work benches, tool stands, shelving, tool storage, lockers, coat racks, filing cabinets, revolving bins, others. Includes dimensions and other specifications. Photos illustrate some typical equipment installations. Lyon Metal Products, Inc.

CONSTRUCTION

383 **Aluminum Building Products**—Form AD 285 is a 32-pp catalog covering company's line of aluminum industrial building products. Cites advantages of aluminum, pictures some installations. Installation data, weights, dimensions and roughing-in details are provided on corrugated roofing and siding, V-beam roofing and siding, ribbed siding sheet, perforated corrugated sheet, flat flashing sheet. A discussion on sandwich wall system is presented. Accessories and fasteners are also covered, and suggested specifications included. Aluminum Co. of America.

384 **Replacement Glazing**—Twelve-pp Booklet PL-251 gives detailed information on glazing industrial and other buildings with flat panels of the acrylic plastic, Plexiglas. Written

Weldor examines 4,200-lb. dredge pump casing repaired quickly and easily with Ni-Rod "55" electrodes.

Finish grinding of welds. Small upper patch is another crack previously repaired with Ni-Rod "55" electrodes.

How welding with Ni-Rod "55" electrode saved a $1,500 cast iron casing

You're looking at part of an "underwater vacuum cleaner."

It's the 4,200-lb. cast iron casing for a dredge pump. And sand, gravel, and rocks were this pump's diet. Until one day a rock tore a big hole through the two-inch thick casing.

At first, the owners were ready to scrap it. Then they decided to try repairing the $1,500 casting by *welding*, with Ni-Rod* "55"* electrodes.

First, their weldor cut grooves in a steel plate and formed it to fit over the hole. Then he started welding with Ni-Rod "55" electrodes. Four passes outside — two inside, with a smaller plate for fill-in. *The entire job took just 6 hours and 10 lbs. of Ni-Rod "55" electrodes. About $20 worth!*

It's easy to weld cast iron with Ni-Rod "55" electrode. *Easy* to make repairs or do production welding.

No special training is required . . . no special equipment. New *easy*-handling Ni-Rod "55" electrodes give stable arc. Smooth bead contour. *Easy* slag removal. Sound, machinable welds.

A helpful folder . . ."Repair Cast Iron Parts Quickly and Easily". . . shows how Ni-Rod "55" electrode makes cast iron welding practical in *any* plant. Write for a copy today. *Registered trademark

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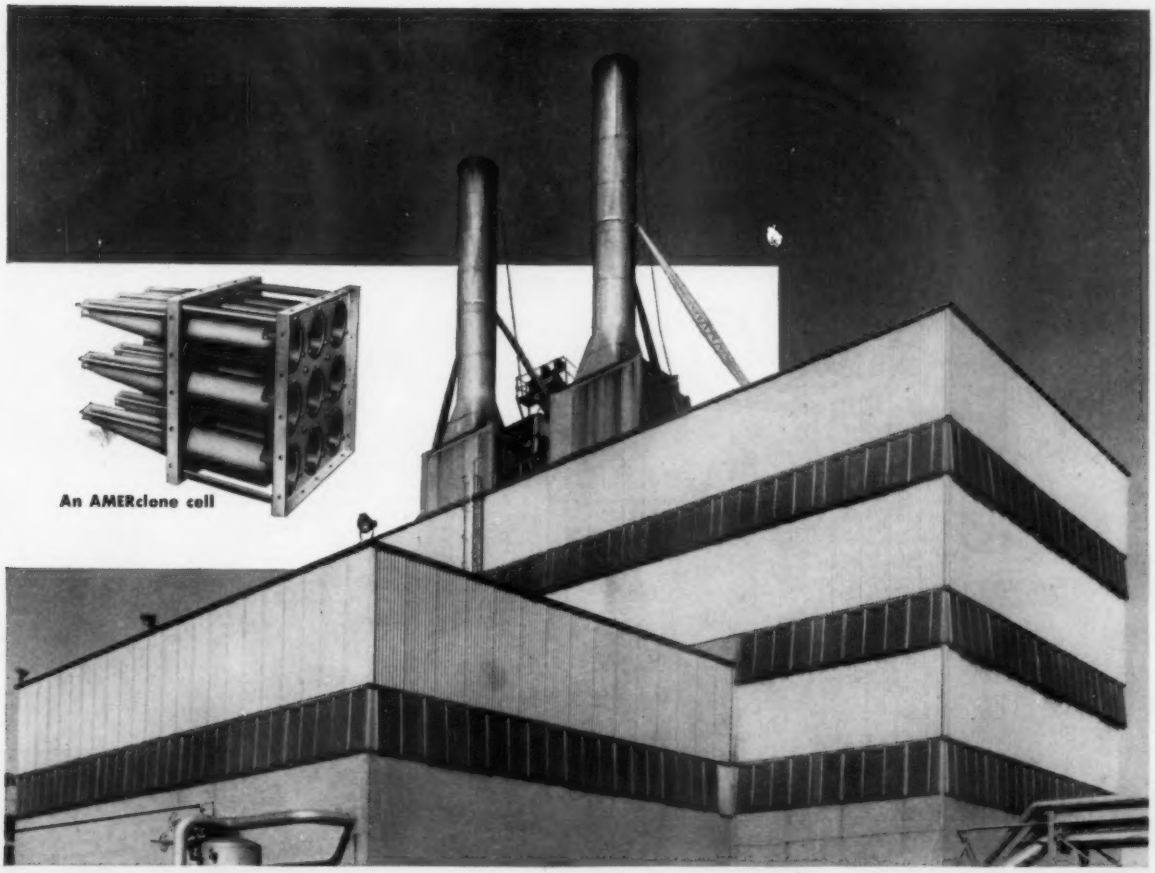

An AMERclone cell

Both of the boilers at this Southern foundry were in operation when this photograph was taken. Note absence of any visible stack effluent.

AMERclone

traps 5 TONS of fly ash DAILY!

Atmospheric Nuisance Eliminated by AAF Dust Control

Boiler fly ash that formerly "went up in smoke" (only to reappear on parking lots and the surrounding neighborhood) has disappeared from the scene at this Southern foundry. An AMERclone system on each of two boilers puts this menace in its place—in the dump, where it can do no harm.

AMERclone does the job, thoroughly . . . operates at 92% efficiency *at all times,* even though boiler room requirements fluctuate as much as 30% in any 24-hour period. High collection efficiency and maintained efficiency are just two of the dollars-and-cents advantages of AMERclone. This dry centrifugal requires less space than comparable units because each 20" x 20" cell (see inset in photograph) has a rating of 3,000 cfm! And the abrasive fly ash has little or no effect on AMERclone's tough, thick-wall gray iron castings.

Don't let a few tons of dust per day stand between you and better working conditions, better community relations. Get all the facts on AMERclone. Call your local AAF representative or write direct for Bulletin 291.

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DATA FILE

(Begins on page 252)

for plant engineers concerned with frequent breakage of windows or other glazing problems, this practical booklet gives properties and behavior of this sheet. Plastic Dept., Rohm & Haas Co.

385 **Window Modernization**—How to modernize old windows with company's glass blocks is told in 8-pp Bulletin GB-104. Selection data is included, along with photos of typical installations. Pittsburgh Corning Corp.

386 **Panel Wall Construction**—The advantages of company's M-Type Q-Panel walls are outlined in 12-pp Bulletin Q35-55. Includes installation photos, diagrams, specifications, as well as drawings, pointing out structural details. H. H. Robertson Co.

388 **Steel Floor Plate**—Skid resistance and other advantages of multigrip rolled steel floor plate are stressed in this illustrated bulletin. Also gives dimensions, weights, data on allowable loads. Typical uses of the floor plate are pictured. United States Steel Corp.

389 Non-Slip Flooring—Algrip, an abrasive rolled steel floor plate described as non-slip even on steep inclines, is the subject of Booklet AL-29, 8 pp. Discusses safety features; gives fabricating data. Alan Wood Steel Co.

390 **Steel Grating and Treads**—Bulletin 2486, 16 pp, describes types, sizes and load characteristics of company's line of electroforged steel and interlocked aluminum grating and treads. Points out advantages in design and construction resulting in greater safety; pictures applications. Blaw-Knox Co.

391 **Data on Panel Material**—How to improve factory methods with Masonite Presdwood is discussed in this 12-pp illustrated bulletin. Advantages are listed and types of presdwood used in maintenance and materials handling are indexed. Which type to use and where is covered, application detailed. Masonite Corp.

PLASTICS, SYNTHETICS

392 **Synthetic Fluids, Lubricants**—Form F-6500D, 52 pp, on synthetics, covers properties, applications, and characteristics of these poly-alkyline-glycol derivatives. Describes uses as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, anti-foam agents, solvents, and formulation components. Engineering data is presented in the form of tables and charts, and application photos included. Carbide and Carbon Chemicals Co., Div., Union Carbide and Carbon Corp.

393 **Solution Resins**—This folder contains a series of bulletins on solution resins, covering six Exon vinyl chloride resins for solution coatings. Outstanding characteristics of each resin are described and a graph showing the solubilities of these resins in methyl ethyl ketone is included. Solution viscosity tables, data on formulating and other information included. Chemical Sales Div., Firestone Plastics Co.

394 **Phenolic Plastics**—A primary evaluation of the properties of company's phenolics and the combinations in which they are available, in thermosetting molding materials and industrial and coating resins, is featured in this illustrated bulletin. Properties and applications are indicated on a chart. Durez Plastics Div., Hooker Electrochemical Co.

SPACE, PROCESS HEATING

395 **Plumbing, Heating Supplies**—Edition H is the current edition of this company's 126-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

396 **On Unit Heaters**—Latest improvements, specifications and performance data for Herman Nelson horizontal and vertical unit heaters are covered in 36-pp Bulletin 700A. Includes complete hot water and steam performance tables, dimensions, selections, applications, descriptions of cabinets, elements, motor mountings, fans and accessories, controls. Also provided are suggested layouts, piping diagrams. American Air Filter Co., Inc.

397 **Revolving Unit Heaters**—Bulletin HR-6A, 16 pp, features revolving unit heaters for industrial plant heating, presenting design and construction details and showing typical installations. Engineering data, mounting heights and coverage, and dimensions are tabulated, and dimension drawings are included, along with installation planning tips and specifications. L. J. Wing Mfg. Co.

398 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12 pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

399 **Electric Heat, 101 Ways**—Principal industrial heating applications and methods are described in "101 Ways to Apply Electric Heat," a 32-pp booklet. Illustrated case histories show how metal-sheathed electric heating units are being used. Physical aspects of installation are detailed along with a discussion of the problem, solution and advantages obtained. To illustrate liquid heating, diagrams and photos show best applications for the elements and heaters. Similar treatment is accorded problems of heating air and gases; melting soft metals and viscous materials; and heating machinery and equipment parts. A section is devoted to far-infrared heating. Edwin L. Wiegand Co.

400 **Unit Heaters**—Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Covers design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

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DATA FILE

(Begins on page 252)

401 **Industrial Ovens**—Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

402 **Industrial Ovens**—Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

ELECTRICAL

403 **Motor Buying Tips**—Bulletins GEC-1026A and GEC 1027A, each 11 pp, give buying information on a selected group of this manufacturer's motors. Included are application data, ratings and prices for fractional horsepower motors, integral-horsepower polyphase and single phase induction motors, motors and control for part winding starting, gearmotors and resilient-base integral-horsepower induction motors. General Electric Co.

404 **Motors, Brakes, Transformers**—Bulletin G-55-2, 8 pp, outlines advantages of company's line of motors, brakes and transformers. Describes applications, construction features, and lists rating data. Wagner Electric Corp.

405 **What You Should Know About Circuit Breakers**—Sixteen-pp Manual 101 explains operating principles of basic circuit breaker designs and provides engineering data on factors of application. Includes simplified diagrams of three basic types. Illustrates with colored charts and diagrams, explains temperature factors, inrush current effects, tripping and reset time. Heinemann Electric Co.

406 **Commutator Slip Ring Maintenance**—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

407 **FHP Manual Starters**—Bulletin 224 is a folder giving the features and ratings of a line of fractional horsepower manual starters. Lists applications for them. Square D Co.

408 **Motor Controls**—In the 86-pp Controlog are cataloged a variety of motor controls including starters, control centers, contactors, relays, switches, and accessories. Fully illustrated with photos and dimensional drawings, gives applications and descriptive information on each class, and includes prices and ordering data. General engineering data included. The Clark Controller Co.

409 **Motor Starters**—Booklet 1062, 16 pp, describes motor starters having short circuit protection for 2200- to 5000-v systems. Illustrates starters using company's 50,000 kva interrupting capacity type HS contactor; also starters which will safely interrupt the circuit from a bus of unlimited capacity. Indoor and outdoor installations are pictured. The Electric Controller & Mfg. Co.

410 **Motor Speed Controls**—Eight-pp Form 927A features motor speed controls for adjustable-speed operation of d-c motors from a-c lines. Applications and advantages are listed, operating principle is detailed, and specification, price and dimensional data are included. General Radio Co.

411 **Variable Speed Motors**—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

412 **Enclosed Switches**—Catalog 83, 28 pp, describes in detail enclosed switches for industrial applications. Included are general switches designed for use on either a-c or d-c applications, sealed switches, heavy-duty limit switches, hand operated switches, and maintained-contact switches, all of which are available in a variety of actuator designs, contact arrangements and electrical ratings. Photos, dimensional drawings, circuit diagrams, electrical data are included. Micro Switch, Div., Minneapolis-Honeywell Regulator Co.

413 **Low Voltage Switchgear**—Twelve-pp Bulletin 6004B presents low voltage switchgear of the metal-enclosed, drawout type for indoor and outdoor installation using Types K and LG air circuit breakers. Design and construction details are explained and illustrated and emphasis is placed on safety advantages afforded by test position with door closed. General specifications and standard frame arrangements given. I-T-E Circuit Breaker Co.

414 **Panel Components**—Bulletin EE-120 is a 54-pp panel builders handbook of electrical components, containing specifications, diagrams, dimensions, photos and price lists of company's motor control. Profusely illustrated with photos, dimensional and wiring diagrams, bulletin covers manual starters, relays and contactors, magnetic starters in non-reversing, reversing, and multi-speed types, and a group of accessories which include thermal overload relays, oil tight pushbutton units, limit switches, timing devices, solenoids, electrical interlocks, and solenoid-operated brakes. Cutler-Hammer, Inc.

415 **Aluminum Conduit Fittings**—To fulfill the need for electrical equipment made of materials which resist corrosive attack of many chemicals destructive to ferrous or standard aluminum equipment, Bulletin 2681 presents a broad selection of Condulets and related equipment utilizing copper-free aluminum alloy in their construction. It includes Condulets, lighting fixtures, plugs and receptacles and others for both hazardous and non-hazardous locations. Book provides a pictorial-descriptive index plus full catalog listings, prices. Crouse-Hinds Co.

416 **Electrical Wires, Cable**—Bulletin 1105, Section 1, 16 pp, features a cable selection chart

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DATA FILE

(Begins on page 252)

and complete engineering information on company's line of electrical wire and cable. Advantages of the products are detailed, a table of insulations furnished, and design and construction features illustrated. The Okonite Co.

417 **Trolley Busway Systems**—Three bulletins offer real help on electrical installations involving cranes and hoists, assembly and production lines, moving test lines and other moving electrical equipment. Bulletin 35 (28 pp) covers 225-500 amp systems; Bulletin 50 (44 pp) 100 amp systems; Bulletin 45 (40 pp) 60 amp systems. Each includes special sections on installation planning and procedure, methods of mounting and descriptions and illustrations of equipment. Feedrail Corp.

418 **Asbestos Insulation**—"Specifications for Asbestos Varnished Cambric N.E.C. Type AVA Lighting Wire and Power Cables," 8 pp, establishes performance tests for asbestos insulation applied as a felted wall in combination with varnished cambric tapes for wires and cables with 600 and 1000 v ratings. Also measures plus values of the construction over and above industry standards. Standards for test characteristics, such as minimum permissible breakdown after initial dielectric test are covered. Rockbestos Products Corp.

419 **Switch Wiring Diagrams**—Bulletin 709 is a 36-pp booklet of typical wiring diagrams for across-the-line starting switches. Indexed and arranged for easy use, this booklet serves as a guide to some of the many ways in which this company's manual and magnetic across-the-line starters can be applied. Some of the diagrams incorporate more than one useful feature. Includes key to electrical symbols used. Allen-Bradley Co.

420 **Flexible Cords**—This well-illustrated 24-pp booklet includes all new Underwriters classifications for flexible cords manufactured by this company. Featuring data on Dynaprene and rubber jacketed cords as well as braid covered types, also gives tips on how to select proper cord. Whitney Blake Co.

421 **Battery Manual**—Battery selection techniques are emphasized in 20-pp Bulletin 210, a revised edition of this manufacturer's manual on storage batteries for stand-by power, emergency lighting and switchgear applications. A discussion of charging equipment and simplified battery maintenance procedures is included. Storage battery installation procedures are described and illustrated by photos. Exide Industrial Div., The Electric Storage Battery Co.

422 **Handbook on Storage Batteries**—This 64-pp booklet on instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

423 **Motive Power Batteries**—This 48-pp general service manual on lead-acid batteries for all types of motive power application is a practical guide to industrial cycle service, including industrial truck, air conditioning, and others. Includes photos, charts, tables, methods of repair, maintenance and theory of operation, instructions covering repairs with regular or special tools, simplified testing methods, including safety practices, acid handling precautions, and charging methods. C. & D. Batteries, Inc.

LIGHTING, COMMUNICATION

424 **Illumination Design Data**—Basic reference data on interior lighting installations is contained in 48-pp Manual A-4854, which features a section describing footcandle levels required for each group of seeing tasks. These footcandle levels are then related to many kinds of rooms and areas. A chapter on interior lighting design describes ways of calculating quantity of light for an area and covers such subjects as selection of lighting systems, maintenance factors, and location of luminaires. A series of tables minimize mathematical calculations necessary; other tables give information on lamps. Westinghouse Electric Corp.

425 **Architectural Floodlighting** — Eight-pp Bulletin GEA-6437 illustrates various methods of floodlighting industrial plants, public and commercial buildings and others. Provides information on general purpose heavy-duty floodlights. Aso contains tips on floodlighting of vertical surfaces and discusses four "musts" of an efficient economical floodlighting installation. A table of recommended foot-candle levels for exteriors provided. General Electric Co.

Postage-free Reader Service Cards make it easy to order catalogs. Cards are provided on pages 247 and 248.

426 **Recessed Lighting**—Divided into sections to aid in selection of lighting units, this 36-pp catalog gives complete illustrations and detailed dimensional data for one- and two-foot architectural troffers in all types of ceiling construction. Includes information on various ceiling lighting patterns, plus selection of shielding designs in plastic, glass, lens (flat and dished), plastic louvers. Also gives photometric tables. Smithcraft Lighting Div.

427 **Outdoor Mercury Lighting**—"How Mercury Vapor Outdoor Lighting Brings More Night Action," 8 pp, stresses low cost and versatility of mercury vapor lamps. Shows their use in such locations as industrial areas, parking lots. Includes data on company's new Silver White lamp, which offers an increase in efficiency over clear lamps. Also features Golden Mercury Vapor lamp, which provides a "warmer" light and is a natural caution light. Sylvania Electric Products Inc.

428 **Signal Equipment**—Tips on how to select suitable signals for any specific opera-

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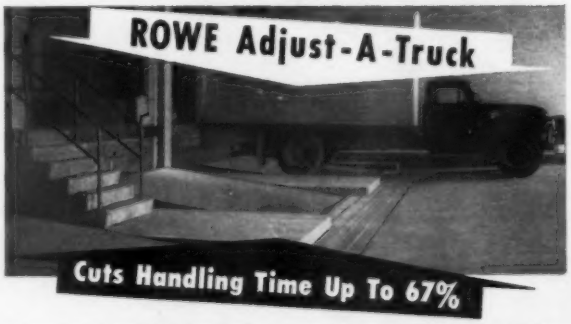

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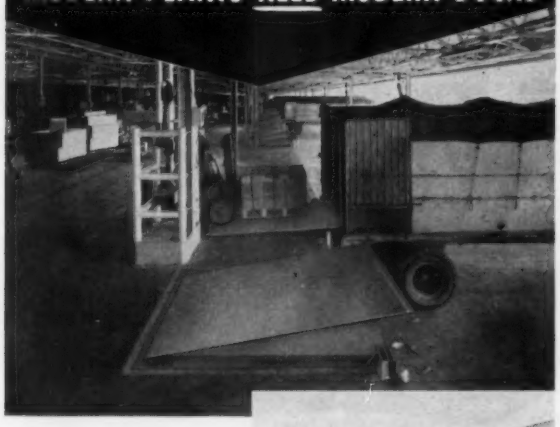

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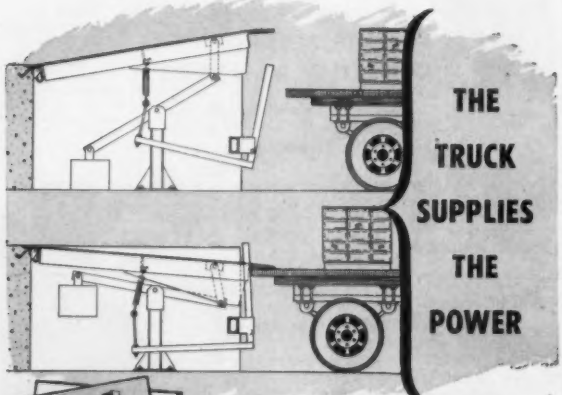

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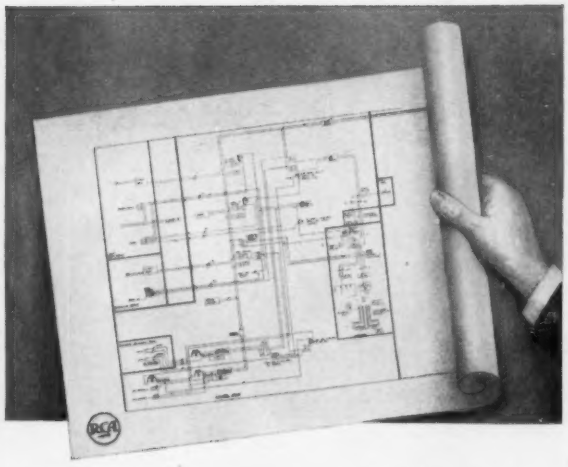

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DATA FILE

(Begins on page 252)

tions are offered in one of a series of bulletins—Nos. 100-125—bound in this 40-pp catalog. Other bulletins describe horns, bells, warning lights, other signal equipment. Specifications, photos, wiring diagrams, dimensions, audibility rating charts, electrical characteristics and other data included. Federal Sign & Signal Corp.

DUST CONTROL

429 **Dust Control**—"Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

430 **Dry-Type Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters for the removal of air-borne impurities given. Dollinger Corp.

431 **Industrial Dust Control**—A wide variety of collection methods for industrial dust control is described in 16-pp Bulletin 922. A typical case history is included, as well as photos, cutaway views, drawings and capacity data on the various units. Pangborn Corp.

FANS, VENTILATING

433 **Induced Draft Fan Data**—In addition to providing an illustrated discussion of design advantages of company's induced draft Bifucator, 20-pp Bulletin DB-44-56 is an excellent working tool on fan selection. Two methods are presented, along with detailed examples of each. Also included are boiler code ratings of various organizations expressed in Btu/hr, and charts on draft losses. Dimensional diagrams are provided, as well. Typical installations are pictured. DeBothezat Fans Div., American Machine and Metals, Inc.

435 **Industrial Fan Catalog**—Of interest to plant engineers requiring quick, accurate selection of industrial fans for specified capacities, 28-pp Bulletin EX-531 contains selection tables from which correct fan for required capacity can be determined. Complete descriptive information, detailed capacity tables and dimensional data are included. Introduces a new fan offering improved efficiency. Bayley Blower Co.

436 **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 152 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of contruction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

437 **Roof Ventilators**—Sixteen-pp Bulletin A-112, revised, covers manufacturer's line of reversible roof ventilators, also penthouse Vertijet, rotary and other models. Sizes, specifications, performance data and dimensional drawings are included. Hartzell Propeller Fan Co.

438 **Flexible Tubing**—Spiratube A and R—flexible, lightweight, reinforced fabric duct designed for carrying air and other gases, many solids, and liquid at low pressure—are described in 8-pp Bulletin 10C-1. Applications are described, and performance data and specifications are included. Flexible Tubing Corp.

BOILERS, GENERATORS

439 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information, is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 40,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

440 **Shop Assembled Boiler**—Sixteen-pp Bulletin G-76 completely describes and illustrates company's Type FM water-tube integral-furnace boiler, made in standard sizes from 2900 to 28,000 lb of steam per hr, pressure to 250 psi. The Babcock & Wilcox Co.

442 **Packaged Generators**—This 16-pp catalog covers a new series of packaged steam generators in sizes from 10,000 to 46,000 lb of steam per hour. Gives capacities, dimensions, construction features. Instrumentation is discussed. Illustrations include sectional drawings and installation photos. Booklet also provides a selection chart on firing equipment and controls. Foster Wheeler Corp.

443 **Automatic Boilers**—Bulletin BE-4 describes operation and advantages of Continental automatic boiler's spinning gas technique—a method of obtaining maximum heat transfer with a simplified design. Shows cutaway view of boiler construction; illustrates hinged doors and method of injecting air through static, turbine-like vanes into burner. Boiler Engineering & Supply Co., Inc.

VALVES, TRAPS, PIPING AND ACCESSORIES

444 **Bronze Valves**—Globe and angle bronze valve with rising stems, union bonnets and stainless steel plug type seats and discs are described in this bulletin. Discusses design advantages, gives dimensions. The Walworth Co.

445 **Diaphragm Valves**—Catalog V-55, 34 pp, covers operation, installation and selection of diaphragm valves for handling of acids, alkalis, gases, volatile and viscous substances, water and other fluids, compressed air vacuum, slurries, semi-solids, beverages and food products. Daiphragm materials are described, selection tables included. Hills-McCanna Co.

446 **Lubricated Plug Valves**—Catalog PV-4, 36 pp, shows in detail a line of iron and steel lubricated plug valves. Many illustrations of single, screwed and bolted gland type valves

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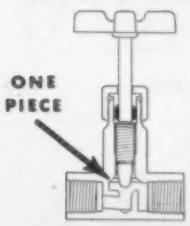

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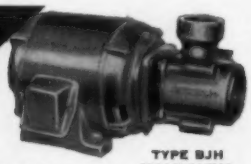

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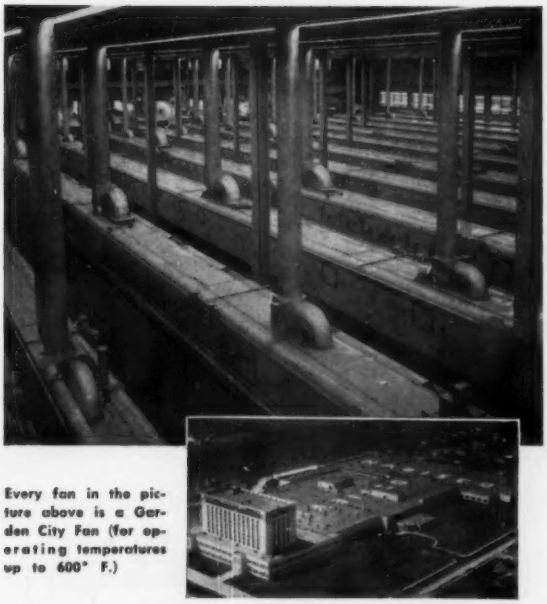

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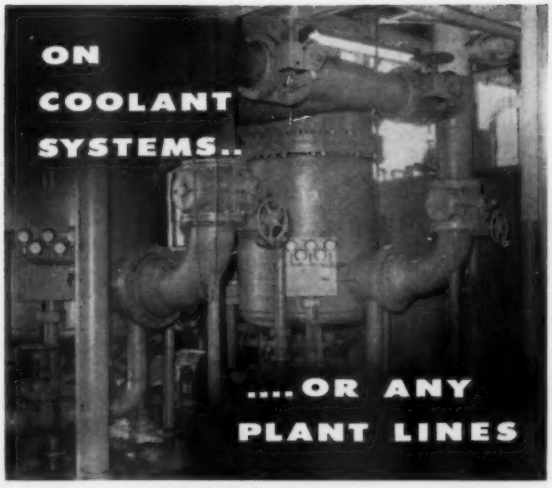

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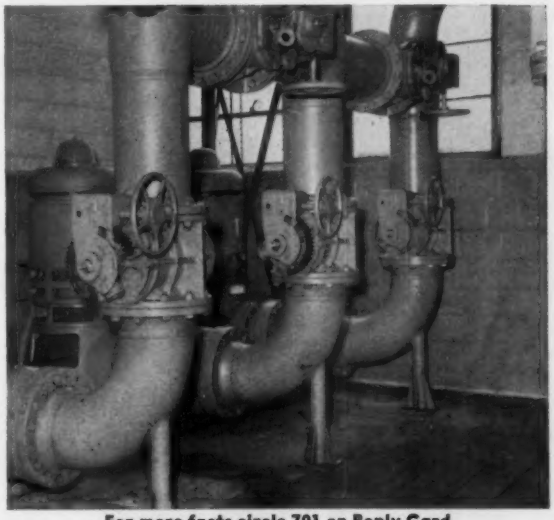

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DATA FILE

(Begins on page 252)

are shown, including photos, sectional and detailed drawings. Also included is physical data on dimensions, ratings. The Wm. Powell Co.

447 **High Pressure Valves**—Bulletin B-451, 12 pp, contains complete engineering data on company's valves for high pressure and high temperatures. Typical installations are pictured, dimensions and weights are tabulated, and temperature-pressure ratings are shown. A selection table is included, as well as information on materials, design. Yarnall-Waring Co.

448 **Unions, Check Valves**—Illustrated Catalog 55, 24 pp, describes and provides ordering information on a line of forged steel unions and check valves. Socket-weld, high-speed, orifice, O-ring and other unions are included. Catalog provides service recommendations, dimensions and list prices. Also included is table on water discharge. Clayton Mark & Co.

449 **Plug-Type Valves**—Long-life features of company's stainless steel plug-type valves are stressed in 6-pp Form 202-A. Cutaway view illustrates important design and operation features, and tables. Jenkins Bros.

450 **For Quick Valve Selection** — Here's a 20-pp catalog digest providing ordering and application information, on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure temperature chart. The Ohio Injector Co.

451 **Corrosion Resistant Valves**—Monel and nickel corrosion-resistant valves are described in Bulletin 9. Discusses corrosion-resistant properties of Monel and nickel, listing specific application for which each is suited. Gives casting composition of both alloys and describes their mechanical properties. Cross-sectional illustrations of gate, globe and check-type valves are included. Alloy Steel Products Co.

452 **For Valve Selection**—Circular 555, 24 pp, is designed as a guide for selecting valves, boiler mountings, and lubricating devices, including the LQ600 bronze globe valves, Luncor PVC all-molded valves, and solder end valves. Tables, technical data and information on the selection of valves, boiler mountings, and lubricating devices are completely indexed for easy reference. The Lunkenheimer Co.

453 **Valve Data** — This loose-leaf notebook contains a collection of company's bulletins on its line of valves for control of air, gas, liquids and solids. It features complete operating, design, dimensional and specification data on butterfly, slide, automatic and proportioning valves, and is profusely illustrated with photos, drawings and diagrams highlighting valve design. W. S. Rockwell Co.

454 **Valve Performance Facts**—Included in this 36-pp booklet are 32 case histories of cost-saving valve installations. Service applications covered include steam, oil, water, coating fluid, chlorine, phenol, pulp stock, vacuum, others. Industries include paper mills, refineries, central stations, other plants. Crane Co.

455 **Steam Trap Book**—Catalog J is a 44-pp manual and ordering guide in which 17 pp are devoted to data on fundamentals of good trapping and trap selection. Installation and maintenance instructions are also provided. Book lists steam traps for maximum pressures of 250, 600, 900, 1500 and 2500 psig. Included, also, is a section on trouble shooting. Armstrong Machine Works.

456 **Steam, Air and Gasoline Traps**—Catalog 751, 32 pp, is a trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for pressure up to 1500 lb. W. H. Nicholson & Co.

457 **Fittings and Tubing**—Steel and zinc coated fittings and tubing are described in illustrated bulletin SF-155. Advantages are detailed and installation diagrams are included. U. S. Hoffman Machinery Corp.

458 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action. Titeflex, Inc.

459 **PVC Pipe Fittings, Flanges**—This is a comprehensive 12-pp catalog on corrosion resistant pipe fittings and flanges in normal- and high-impact grades, rigid, unplasticized polyvinyl chloride. Shows characteristics, advantages and limitations. Lists operating pressures, temperatures, applications, price comparisons, fabrication advice, installation and supporting recommendations, dimensions and weights. Grinnell Co., Inc.

460 **Pipe for Modern Buildings**—This 16-pp booklet discusses wrought iron pipe for modern buildings. Identifies wrought iron pipe and describes composition and advantages. Included are sections on wrought iron's resistance to corrosion and fatigue stresses, weldability, forming and threading, as well as the application of protective coatings. A. M. Byers Co.

461 **Bellows Design Guide**—Twenty-pp Catalog 155 contains helpful information on applications, design considerations, and standards for metallic bellows. Details on using bellows manufactured from various metals are included. Tables supplement text. Flexonics Corp.

OTHER EQUIPMENT

462 **After Cooler**—Bulletin 130, 8 pp, explains functions of company's Aero after cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photos. Included also are diagrams and illustrations of applications in liquefication systems. Niagara Blower Co.

463 **Industrial Finishing Equipment**—Catalog A-657, 12 pp, describes a complete modern finishing system for cleaning, rust proofing, drying, painting and finish baking operations. Typical finishing systems handling a variety of

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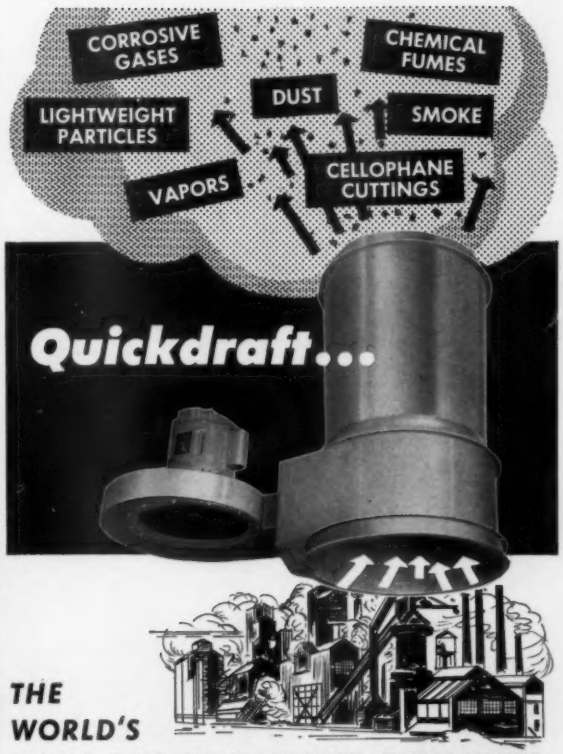

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DATA FILE

(Begins on page 252)

products are pictured and details on how system can be designed to accommodate any product and meet any production requirement are furnished. The R. C. Mahon Co.

464 Television Equipment — Twenty basic applications for "TV Eye" low-cost closed circuit television equipment are described and pictured in Form 3R2335. Folder explains equipment's functions and operation, lists specifications. Radio Corp. of America.

465 Magnetic Selection Guide — Twelve-pp illustrated Catalog C-5000-B, describing manufacturer's entire line of magnetic separators and lifting magnets, serves as handy guide to selection. Dings Magnetic Separator Co.

466 Cathodic Protection—This 12-pp illustrated technical brochure presents cathodic protection systems for corrosion control. Describes effect of galvanic action on metals in contact with earth or water, and explains principles utilized by these systems to halt existent corrosive action or keep new installations free of it. Savings gained by such protection are discussed and case histories given. Some typical applications are shown, and company's engineering services told. The Harco Corp.

467 Neoprene Design Book—This illustrated bulletin discusses the properties of Neoprene, showing how they are utilized in products made from this chemical rubber. Covers its toughness, hardness range, air retention, performance under load, at extreme temperatures, flame and chemcial resistance. Elastomers Div., E. I. du Pont de Nemours & Co.

468 Brinemaking Manual—Details on modern brinemaking methods and equipment are presented in 12-pp Manual 135. Three types of brinemakers are described, as well as a wet salt storage system, and cutaway views and diagrams are included. Morton Salt Co.

470 Equipment Selector Charts — Bulletin CE-50, 20 pp, contains selector charts on corrosion-resistant equipment for process industries. Tables cover general considerations in selection of material, physical properties, corrosion resistance, techniques and skill in manufacture of equipment. Describes rubber and plastic pipe, tubing and fittings; valves; pumps; rubber-lined tanks. American Hard Rubber Co.

471 Ductile Iron — Cast iron that can be bent is described in this 28-pp revised edition, with tables, charts and photos. Photos show applications of ductile iron castings, and bulletin lists typical applications in various industrial fields. The International Nickel Co., Inc.

472 Abrasion, Corrosion Protection — This 24-pp book illustrates how company's rubber faced steel plate reduces maintenance cost resulting from abrasion or corrosion. Shows case histories in a wide variety of industries. The Gates Rubber Co.

473 Draft Creator — Capacity data for Quickdraft units are presented in 8-pp Form QF-SD. Seven capacity tables provide means for determining capacity of standard units when installed under hundreds of different conditions. An insert pictures and describes typical installations of the units. Quickdraft Co.

474 Pipe Insulation—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between —300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

475 Aluminized Steel—Bulletin P.O. 3056 describes the properties and characteristics of Aluminized steel Type I, a special-purpose steel reported to have resistance to combinations of heat and corrosion; high heat reflectivity; and the surface qualities of aluminum with the strength of steel. Armco Steel Corp.

476 Hydraulic Cylinders — Catalog 200-6, 26 pp, describes company's hydraulic cylinders for die casting, pushing, lifting, holding, pulling, tilting, clamping, pressing, turning, squeezing and other power movements in any direction. Construction features and specifications are detailed, sectional drawing showing component parts is included, as well as dimensional and mounting data. Logansport Machine Co., Inc.

477 Rescue Equipment—A complete line of hydraulically operated rescue equipment for use in releasing victims trapped in wrecked vehicles, under debris, and in burning buildings is described in 12-pp Catalog HR-300. Pictures show how victims are freed by Porto-Power from a wide variety of disaster situations. Blackhawk Mfg. Co.

478 Incinerators — "The Incinerator Blue Book" is a 16-pp bulletin on incinerator developments, covering design features, methods of feeding or charging of refuse, waste analysis, and other information. An incinerator selection chart, classification of incinerators, capacity and dimension data and incinerator specifications are included. Joseph Goder, Inc.

479 For Shell Molding—"Plaskon Resins for Shell Molding," 32 pp, describes shell molding process for casting metals. Includes design and production considerations such as cost; available types of molding machinery and selection factors; gating techniques and precautions; pattern design; resin bonding of shell molds; special metals handling; and sand reclamation. Detail drawings and sketches show representative shell molding machinery, typical pattern designs and techniques. Barrett Div., Allied Chemical & Dye Corp.

480 Mechanical Seals — Bulletin AD-150, 8 pp, features complete data on Type BB-21A Mechanipak seal. Tells how it works and illustrates operation and design features with cutaway drawings. Typical applications are listed and specifications are tabulated. The Garlock Packing Co.

481 Feedwater Treatment—Process Bulletin B1, "Treatment of Boiler Feedwater by the Direct, or Indirect Method," discusses advantages of direct treatment, as a complete treating program or as a supplement to external systems. Explains why direct treatment is convenient, economical, and complete, and points out how it improves steam quality and reduces maintenance. National Aluminate Corp.

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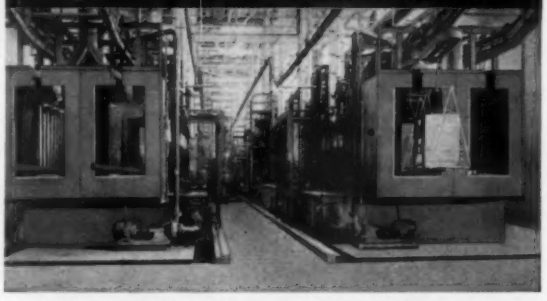

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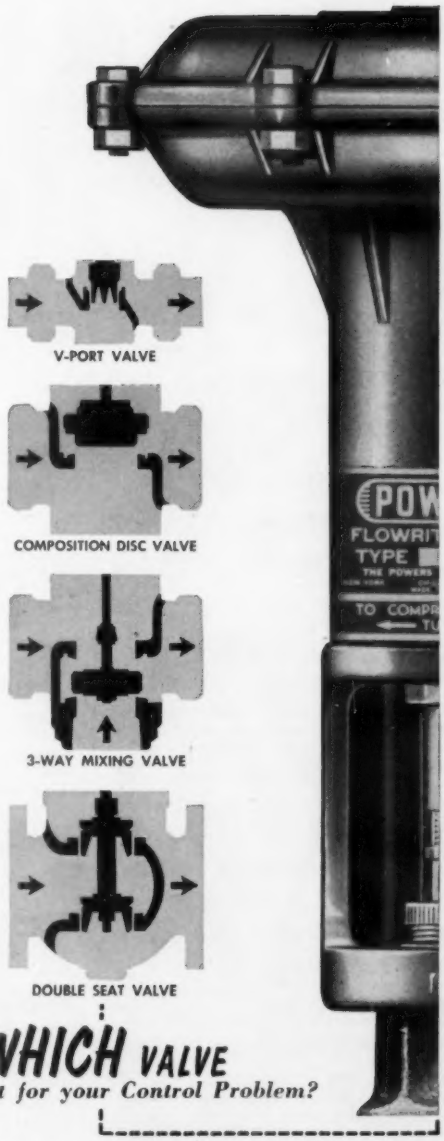

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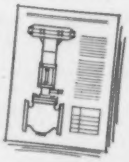

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Agency—Vansant, Dugdale & Co., Inc.

BLACKHAWK MFG. COMPANY 73
Agency—Klau-Van Pietersom-Dunlap, Inc.

BOILER ENGINEERING & SUPPLY CO. 79
Agency—William Jenkins, Advertising

BUCYRUS-ERIE COMPANY 164
Agency—Bert S. Gittins, Adv.

BUELL ENGINEERING COMPANY 207
Agency—Hicks & Greist, Inc.

BUFFALO FORGE COMPANY 42
Agency—Melvin F. Hall Adv. Agency

BULLDOG ELECTRIC PRODUCTS CO. 63
Agency—MacManus, John & Adams, Inc.

BYERS COMPANY, A. M. 3
Agency—Ketchum, MacLeod & Grove, Inc.

C & D BATTERIES, INC. 92
Agency—John T. Hall & Co.

CHAMPION LAMP WORKS 198
Agency—Walter B. Snow & Staff

CINCINNATI CLEANING & FINISHING MACH. CO. 254
Agency—Baer, Kemble & Spicer, Inc.

CLARK, CUTLER & McDERMOTT CO. 231
Agency—Randolph Associates

COLORADO FUEL & IRON CORP. 224, 275
Agency—Doyle, Kitchen & McCormick, Inc.

COLUMBUS McKINNON CHAIN CORP. 244
Agency—Comstock & Company

COMBUSTION ENGINEERING, INC. 167
Agency—G. M. Basford Company

CONTINENTAL ELECTRIC EQUIP. CO. 205
Agency—Baer, Kemble & Spicer, Inc.

CORNING GLASS WORKS 194
Agency—Charles L. Rumrill & Co.

CRANE CO. 169
Agency—The Buchen Company

CROUSE-HINDS COMPANY 39
Agency—Barlow Adv. Agency, Inc.

CRUCIBLE STEEL CO. OF AMERICA 269
Agency—G. M. Basford Co.

CULLEN-FRIESTEDT, INC. 276
Agency—Ross Llewellyn, Inc.

CUTLER-HAMMER, INC. ..... Back Cover
Agency—Kirkgasser-Drew

DARLING VALVE & MFG. CO. 65
Agency—Griswold-Eshleman Co.

DE ZURIK CORPORATION 273
Agency—Stockinger Company

DIAMOND CHAIN COMPANY, INC. 59
Agency—Kirkgasser-Drew Advertising

DINGS ELECTRONICS, INC. 256
Agency—Russell T. Gray, Inc.

DODGE MFG. CORPORATION 216, 217
Agency—Lamport, Fox, Prell & Dolk, Inc.

DOLLINGER CORPORATION ..... 3rd Cover
Agency—Hutchins Adv. Co., Inc.

DOUGLAS FIR PLYWOOD ASSOCIATION 202, 203
Agency—Condon Company

DRACCO CORPORATION 156
Agency—Jayme Organization, Inc.

DRAVO CORPORATION 18-19
Agency—Ketchum, MacLeod & Grove, Inc.

DU PONT DE NEMOURS & CO., E. I. 193
Agency—N. W. Ayer & Son, Inc.

DU PONT DE NEMOURS & CO., E. I. 255
Agency—Batten, Barton, Durstine & Osborn, Inc.

ECONOMY FUSE & MFG. CO. 191
Agency—Hanson & Stevens, Inc.

ELASTIC STOP NUT CORP. 277
Agency—G. M. Basford Co.

ERIE TOOL WORKS 234
Agency—Lando Advertising Agency

EXIDE INDUSTRIAL DIVISION ELECTRIC STORAGE BATTERY CO. 74-75
Agency—Gray & Rogers

EXTREMULTUS, INC. 197
Agency—Woodard, Voss & Hevenor, Inc.

FALK CORPORATION 187
Agency—Reincke, Meyer & Finn, Inc.

FAULTLESS CASTER CORPORATION 44
Agency—Perrin-Paus Company

FEDERAL PACIFIC ELECTRIC CO. 76-77
Agency—Hicks & Greist, Inc.

FEDERAL SIGN & SIGNAL CORP. 274
Agency—Ladd, Southward & Bentley, Inc.

FEEDRAIL CORPORATION 212
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

FINNELL SYSTEM, INC. 241
Agency—Johnson, Read & Co.

FIRESTONE PLASTICS COMPANY 11
Agency—Grey Advertising Agency, Inc.

FISKE BROTHERS REFINING COMPANY LUBRIPLATE DIVISION 28
Agency—E. M. Freystadt Associates, Inc.

FLEXIBLE TUBING CORPORATION 192
Agency—Wilson, Haight, Welch & Grover, Inc.

FLEXONICS CORPORATION 147
Agency—Russell T. Gray, Inc.

FOSTER COMPANY, BENJAMIN 228
Agency—Elmer P. Cook Associates

FOSTER WHEELER CORPORATION 31
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

GARDEN CITY FAN CO. 273
Agency—Martin Company

GARDNER-DENVER COMPANY 214
Agency—The Buchen Company

GARLOCK PACKING COMPANY 165
Agency—Hutchins Adv. Company, Inc.

GATES RUBBER COMPANY 204
Agency—Harold Walter Clark, Inc.

GENERAL ELECTRIC COMPANY APPARATUS DIVISION ..... 14 thru 16, 34-35, 222
Agency—G. M. Basford Company

GENERAL ELECTRIC COMPANY LAMP DIVISION 33
Agency—Batten, Barton, Durstine & Osborn, Inc.

GENERAL PRECISION LABORATORY, INC. 184
Agency—Geer, DuBois & Co., Inc.

GENERAL RADIO COMPANY 158
Agency—K. E. Morang Company

GLOBE HOIST COMPANY 253
Agency—Eldridge Company

GODER INCINERATORS, JOSEPH 250
Agency—Harry F. Port, Advertising

GOODRICH COMPANY, B. F. 83
Agency—Griswold-Eshleman Company

GOULD-NATIONAL BATTERIES, INC. 150
Agency—Hutchins Advertising Co., Inc.

GR PRODUCTS, INC. 274
Agency—Norman-Navan, Inc.

GRAYBAR ELECTRIC COMPANY 89
Agency—G. M. Basford Company

GRINNELL COMPANY, INC. 5
Agency—Noyes & Company

GULF OIL CORPORATION ..... 69 thru 72
Agency—Ketchum, MacLeod & Grove, Inc.

HALL LABORATORIES, INC. 57
Agency—Ketchum, MacLeod & Grove, Inc.

HAMER VALVES, INC. 188
Agency—The McCarty Company

HANNIFIN CORPORATION 236
Agency—The Buchen Company

HARCO CORPORATION 268
Agency—Penn & Hamaker, Inc.

HARNISCHFEGER CORPORATION 233
Agency—Hoffman & York, Inc.

HAZARD INSULATED WIRE WORKS 53
Agency—Doyle, Kitchen & McCormick, Inc.

HEINEMANN ELECTRIC COMPANY 182
Agency—Thomas R. Sundheim

HERCULES POWDER COMPANY 267
Agency—Fuller & Smith & Ross, Inc.

HOOKER ELECTROCHEMICAL CO. 179
Agency—Charles L. Rumrill & Co., Inc.

HUNTER DIVISION ROBBINS & MYERS, INC. 186
Agency—Greenhaw & Rush, Inc.

INDUSTRIAL FILTRATION COMPANY 242
Agency—Drennan W. Hart & Co.

INTERNATIONAL MOLDED PLASTICS, INC. 243
Agency—Penn & Hamaker, Inc.

INTERNATIONAL NICKEL CO., INC. 264
Agency—Marschalk Pratt Co., Inc. Div. of McCann-Erickson

I-T-E CIRCUIT BREAKER COMPANY SWITCHGEAR DIVISION 245
Agency—Gray & Rogers

JENKINS BROS. 246
Agency—Darrell Prutzman Associates

JOHNS-MANVILLE 199
Agency—J. Walter Thompson Co.

JOHNSON & SON, INC., S. C. 189
Agency—Needham, Louis & Brorby, Inc.

JOY MANUFACTURING COMPANY 23, 222
Agency—W. S. Walker Advertising, Inc.

KELLEY COMPANY, INC. 271
Agency—Keck Advertising Agency

KOPPERS COMPANY, INC. 183
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

KOPPERS COMPANY, INC. 259
Agency—VanSant, Dugdale & Co., Inc.

KORFUND COMPANY, INC. 254
Agency—Sanger-Funnell, Inc.

LE ROI DIVISION WESTINGHOUSE AIR BRAKE CO. 250
Agency—Hoffman & York, Inc.

LINK-BELT COMPANY 49, 210
Agency—Klau-Van Pietersom-Dunlap, Inc.

LOGANSPORT MACHINE CO., INC. 226
Agency—Willis S. Martin Co.

LOUIS ALLIS COMPANY 66-67
Agency—Hoffman & York, Inc.

LOVEJOY FLEXIBLE COUPLING CO. 236
Agency—Symonds, MacKenzie & Co., Inc.

LUBRIPLATE DIVISION, FISKE BROS. REFINING COMPANY 28
Agency—E. M. Freystadt Associates, Inc.

LYON METAL PRODUCTS, INC. 32
Agency—Reincke, Meyer & Finn, Inc.

MAHON COMPANY, THE R. C. 17
Agency—Anderson, Inc.

MANHEIM MFG. & BELTING CO. 235
Agency—VanSant, Dugdale & Co., Inc.

MANNING, MAXWELL & MOORE, INC. 154
Agency—Fuller & Smith & Ross, Inc.

MARLEY COMPANY 62
Agency—Valentine-Radford, Adv.

MARSH INSTRUMENT CO. 272
Agency—Kreicker & Meloan, Inc.

MATHEWS CONVEYER COMPANY 46
Agency—Meek & Thomas, Inc.

MICRO SWITCH DIV. OF MINNEAPOLIS-HONEYWELL REG. CO. 143
Agency—Reincke, Meyer & Finn, Inc.

MINNEAPOLIS-HONEYWELL REGULATOR CO. 166
Agency—Aitkin-Kynett Co.

MORTON SALT COMPANY 239
Agency—Needham, Louis & Brorby, Inc.

NAGLE PUMPS, INC. 256
Agency—Tri-State Adv. Co., Inc.

NATIONAL ALUMINATE CORPORATION 20
Agency—Armstrong Advertising Agency

NATIONAL LEAD COMPANY 209
Agency—Rittenhouse & Company

NATIONAL MATERIAL HANDLING EXPOSITION 52
Agency—James R. Flanagan Adv. Agency

NEWCOMB-DETROIT CO. 276
Agency—Gray & Kilgore, Inc.

NIAGARA BLOWER COMPANY 279
Agency—The Moss-Chase Co.

NICHOLSON & CO., W. H. 149
Agency—Aitkin-Kynett Co.

NORGREN COMPANY, C. A. 6
Agency—Galen E. Broyles Co., Inc.

OKONITE COMPANY 53
Agency—Doyle, Kitchen & McCormick, Inc.

OTIS ELEVATOR COMPANY 84-85
Agency—G. M. Basford Company

PANGBORN CORPORATION 64
Agency—VanSant, Dugdale & Co., Inc.

PARTLOW CORPORATION 200
Agency—Moser & Cotins, Inc.

PITTSBURGH CORNING CORP. 153
Agency—Ketchum, MacLeod & Grove, Inc.

PLANET CORPORATION 229
Agency—Jepson-Murray, Advertising

POWELL CO., THE WILLIAM 251
Agency—Ralph H. Jones Company

POWERS REGULATOR COMPANY 277
Agency—Waldie & Briggs, Inc.

QUICKDRAFT COMPANY 275
Agency—Penn & Hamaker, Inc.

RADIATOR SPECIALTY COMPANY 260
Agency—Bennett-Evans Company

RADIO CORP. OF AMERICA 240, 271
Agency—Al Paul Lefton Co.

RAMSET FASTENING SYSTEM 218
Agency—Fuller & Smith & Ross, Inc.

RANSOHOFF, INC. 238
Agency—Julian J. Behr Company

REMINGTON ARMS CO., INC. 206
Agency—Batten, Barton, Durstine & Osborn, Inc.

RICHARDS-WILCOX MFG. CO. 174
Agency—Connor Associates, Inc.

RIDGE TOOL COMPANY 243
Agency—Carr Liggett Adv., Inc.

ROBBINS & MYERS, INC. 220
Agency—Odiorne Industrial Adv.

ROBBINS & MYERS, INC. 1, 54-55
Agency—Weber, Geiger & Kalat, Inc.

ROBERTSON CO., H. H. 221
Agency—Bond & Starr Inc.

ROCKBESTOS PRODUCTS CORP. 157
Agency—Sutherland-Abbott, Adv.

ROCKWELL COMPANY, W. S. 260
Agency—Spooner & Kriegel

ROCKWELL MFG. COMPANY 37, 201
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

ROHM & HAAS COMPANY 45
Agency—Arndt, Preston, Chapin, Lamb & Keen, Inc.

ROME CABLE CORPORATION 141
Agency—Charles L. Rumrill & Co., Inc.

ROTARY LIFT COMPANY 208
Agency—Greenhaw & Rush, Inc.

ROURA IRON WORKS, INC. 258
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

ROWE METHODS 270
Agency—Dix & Eaton

RUST-OLEUM CORPORATON 61
Agency—O'Grady-Andersen-Gray, Inc.

SARCO COMPANY, INC. 161
Agency—Marsteller, Rickard, Gebhardt & Reed, Inc.

SCHRAMM, INC. 178
Agency—Harris D. McKinney, Inc.

SEXAUER MFG. CO., INC., J. A. 240
Agency—Lawrence Peskin, Inc.

SKIL CORPORATION 47
Agency—Fuller & Smith & Ross, Inc.

SLY MFG. COMPANY, THE W. W. 232
Agency—The Bayless-Kerr Company

SMITHCRAFT LIGHTING 190
Agency—Parsons, Friedman & Central

SOCONY MOBIL OIL CO., INC. 50-51
Agency—Compton Advertising, Inc.

SPENCER TURBINE COMPANY 176
Agency—William Schaller Co., Inc.

SQUARE D COMPANY ..... Second Cover, 24-25, 155
Agency—Reincke, Meyer & Finn, Inc.

STANDARD OIL CO. (INDIANA) 163
Agency—D'Arcy Advertising Company

STANDARD PRESSED STEEL CO. 90-91
Agency—Gray & Rogers

SUGAR BEET PRODUCTS CO. 257
Agency—Whipple & Black Adv. Co.

SUN OIL COMPANY 41
Agency—Ruthrauff & Ryan, Inc.

SYLVANIA ELECTRIC PRODUCTS, INC. 225
Agency—J. Walter Thompson Co.

TEMPLETON, KENLY & CO. 258
Agency—Stoetzel & Associates, Inc.

THOMAS FLEXIBLE COUPLING CO. 4
Agency—Reinhold C. Ferster, Adv.

TITEFLEX, INC. 223
Agency—Arndt, Preston, Chapin, Lamb & Keen, Inc.

UNITED STATES ELECTRICAL MOTORS, INC. 181
Agency—The McCarty Company

UNITED STATES HOFFMAN MACHINERY CORP. 280
Agency—Mohr Associates, Inc.

UNITED STATES STEEL CORP. 43, 195
Agency—Batten, Barton, Durstine & Osborn, Inc.

VIKING PUMP COMPANY 262
Agency—J. M. Hickerson, Inc.

WAGNER ELECTRIC COPORATION 160
Agency—Arthur R. Mogge, Incorporated

WALWORTH 230
Agency—G. M. Basford Company

WAYNE MANUFACTURING COMPANY 196
Agency—H. M. Gardner & Associates

WELLINGTON SEARS CO. 48
Agency—Ellington & Company, Inc.

WESTERN ELECTRIC COMPANY 263
Agency—Cunningham & Walsh

WESTINGHOUSE ELECTRIC CORP. 26-27, 172, 173, 175, 177
Agency—Fuller & Smith & Ross, Inc.

WESTINGHOUSE ELECTRIC CORP. 152
Agency—McCann-Erickson, Inc.

WHITNEY CHAIN COMPANY 237
Agency—Woodward & Byron, Inc.

WICKWIRE SPENCER STEEL DIV. OF CF&I 224, 275
Agency—Doyle, Kitchen & McCormick, Inc.

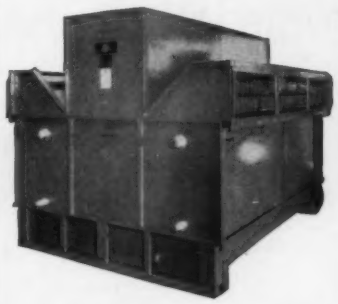
WIEGAND CO., EDWIN L. 244
Agency—Ketchum, MacLeod & Grove, Inc.

WIRE & IRON PRODUCTS CO., INC. 266
Agency—Rossi & Company

WORTHINGTON CORPORATION 145-146
Agency—Needham, Louis & Brorby, Inc.

YALE & TOWNE MFG. CO. 261
Agency—Ruthrauff & Ryan, Inc.

YARNALL-WARING COMPANY 80
Agency—The Michener Company



NIAGARA SECTIONAL *Aero* HEAT EXCHANGER gives close temperature control, saves you LABOR, Power, Water

- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because new features keep your equipment working for long life with "new plant" efficiency . . . always full capacity.**
- **Because you save 95% of cooling water cost.**

You get faster, more accurate cooling of industrial fluids to specified temperatures.

You improve your quality of production by removing heat at the rate of input.

You save labor in upkeep. With full access to all interior parts and piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 7,000,000 to 18,000,000 Btu/hr. No other heat exchange method gives you so much saving in money and convenience.

Write for Niagara Bulletin No. 132

NIAGARA BLOWER COMPANY
Dept. PE-4, 405 Lexington Ave.
NEW YORK 17, N. Y.
District Engineers in Principal Cities of U. S. and Canada

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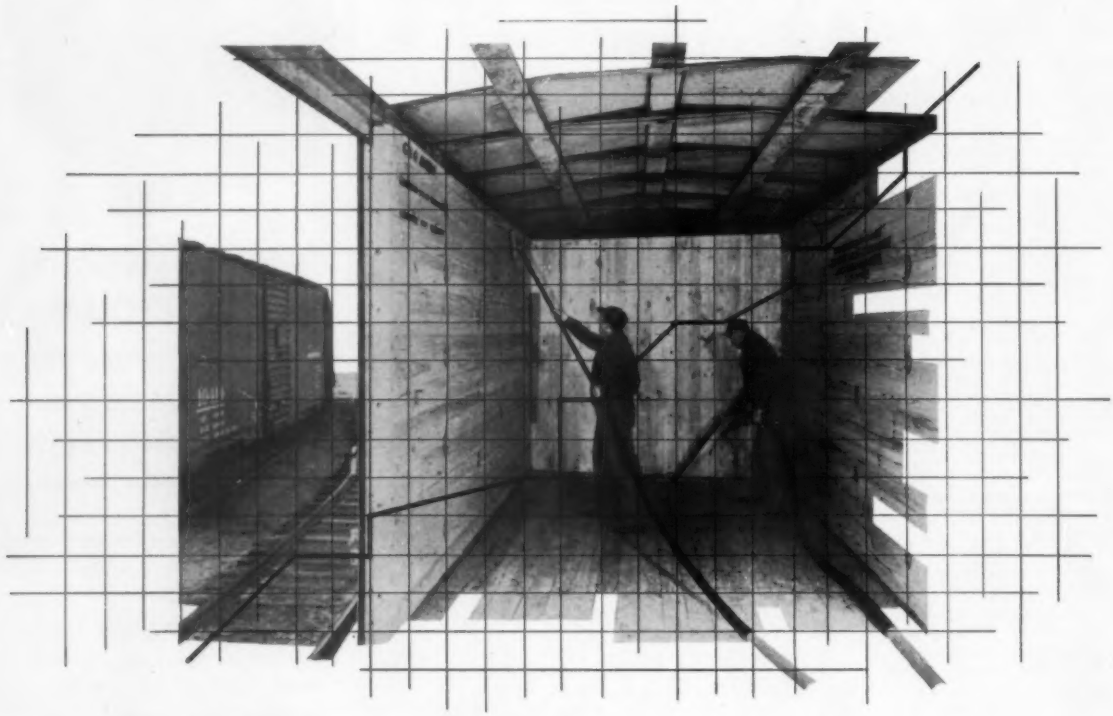
Hoffman engineered systems get **results:**



specially designed and installed

HOFFMAN INDUSTRIAL VACUUM-CLEANING SYSTEM

helps RAHR MALTING CO. provide a "clean ride" for its product!

To maintain their standards of product purity, the Rahr Malting Company thoroughly cleans each boxcar before loading, using a heavy-duty, industrial vacuum-cleaning system engineered by Hoffman.

A 30 h. p. multistage centrifugal exhauster provides high vacuum, which permits rapid removal of material remaining from previous loadings and of accumulated dust and dirt. Two-inch hose and cleaning tools are attached to the high-suction system. Two men assigned to each car draw out all loose material from the surface of inner and outer walls, floor and every corner and crevice. Complete cleaning requires about 40 minutes.

Here is another demonstration of the Hoffman approach to the many problems that can be solved by sound pneumatic engineering — including yours.

Write today for Bulletin M-133, describing Hoffman stationary systems, without cost or obligation.

AIR APPLIANCE DIVISION **U.S.HOFFMAN MACHINERY CORPORATION** Dept. PE, 103 FOURTH AVENUE, N. Y. 3, N. Y.

AIR APPLIANCE DIVISION Multistage Centrifugal Blowers and Exhausters. Pneumatic Conveying Equipment. Industrial Vacuum Cleaning—Portable and Stationary Systems. Continuous Metal Strip Driers. "Smoothflow" Fittings and Tubing. **INDUSTRIAL FILTRATION DIVISION** Machine Tool Coolant Clarifiers—Flotation, Mechanical, and Magnetic. Lubricating and Insulating Oil Conditioners, Filters, and Vaporizers. Solvent Recovery Systems—Vacuum Stills and Filters. **ORDNANCE EQUIPMENT DIVISION** Special Pneumatic Conveying Systems, High Efficiency Centrifugal Separators. Stationary and Portable Vacuum Cleaning Equipment. Process Equipment. Pneumatic Systems for Radioactive Materials.

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STAYNEW

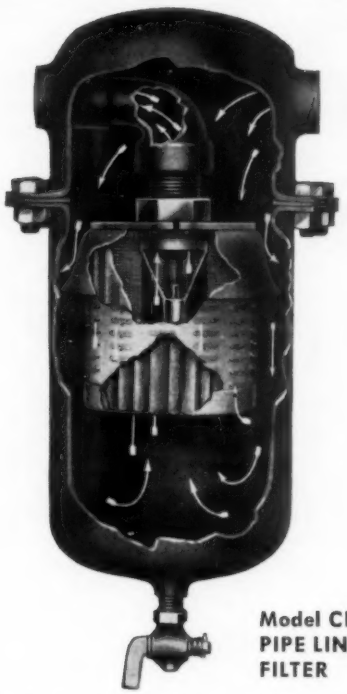
PIPE LINE FILTERS

FOR

CLEAN DRY AIR

IN

- AIR OPERATED INSTRUMENTS
- AIR OPERATED TOOLS
- PNEUMATIC CONTROLS
- INDUSTRIAL PROCESSES

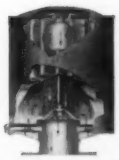


Model CPH PIPE LINE FILTER

MODEL CPH PIPE LINE FILTER has exclusive Staynew "double action principle." Air is first deflected to outer walls of filter and forced downward at high speed. Water, oil and heavier particles of rust, etc., are thus deposited in base. Mechanically cleaned air then rises to pass through filtering medium which removes lighter airborne particles. This double action design eliminates need for frequent cleaning.

Inexpensive, simple to install and maintain, Staynew Pipe Line Filters keep your air-operated equipment free from the destructive effects of pipe scale, dust, dirt, and condensates. And, Staynew Filters pay for themselves in reduced equipment maintenance costs alone. They filter compressed air under all pressures and temperatures, natural and manufactured gases. Dollinger engineers will welcome your filtration problems. Why not call on us. Remember, Dollinger *makes* every type of filter for every industrial need.

Write for Bulletin 200 which contains complete engineering data and illustrated material on Staynew Pipe Line Filters. Dollinger Corporation, Dept. 55, Centre Park, Rochester 3, N. Y.



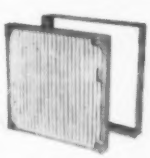
INTAKE FILTERS

LIQUID FILTERS

PIPE LINE FILTERS

ELECTRO-STAYNEW PRECIPITATOR

AUTOMATIC AIR FILTERS



PANEL FILTERS

SPECIAL FILTERS

PROTECTOMOTOR

STAYNEW **DOLLINGER**

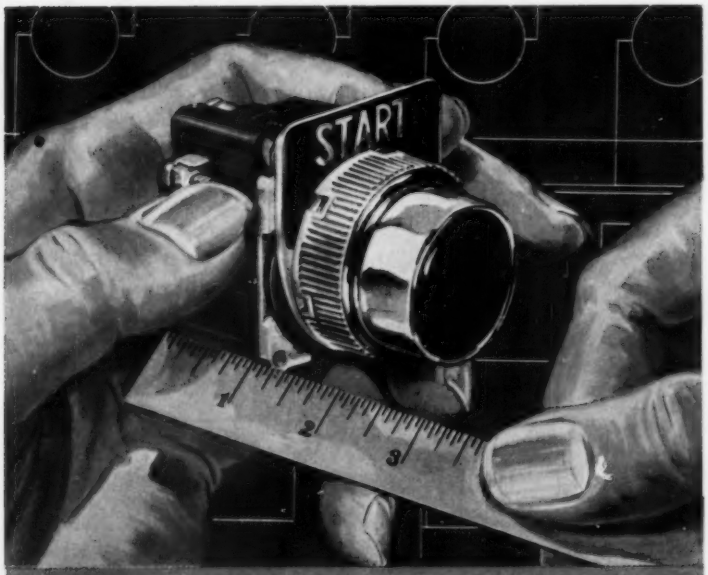
FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

For more facts circle 713 on Reply Card

☆ ☆ ☆

Machine designers say these new heavy duty pushbutton units have no equal and prove it by adopting them as standard equipment



These are the world's smallest heavy duty pushbuttons. They require a behind-the-panel depth of only 1 3/32". This is 40% less space than needed by the next smallest units on the market. Double-pole contact blocks are available in all combinations of normally open and normally closed contacts. Each control circuit is electrically and mechanically isolated from the other. Each circuit is clearly identified and all terminals are color coded. Rapid on-the-job circuit additions are obtained by stacking contact block on contact block.

☆ *they install easier*

☆ *they work better*

☆ *they last longer*

Design engineers are quick to recognize that these new heavy duty pushbuttons have *everything*. There is nothing on the market like them. They are amazingly compact to require the least back-of-panel depth. They are one-hole mounting and they are oil tight. They easily provide for as many as eight separate control circuits per pushbutton, eight completely isolated heavy duty contacts either normally open or normally closed. The buttons may be flush type, the extended type or with mushroom heads. They can be black, red, yellow, green or gray. See the new one-button control station, C-H Roto-Push. See the easiest-to-install maintained-contact pushbutton attachment and the means for padlocking any of the standard pushbuttons. There are both knob and key operated selector switches in this complete line. Also matching indicating lights and the new automation safety light, PresTest. Be sure you have complete information *now*. Write today on your company letterhead for a copy of the new Cutler-Hammer Pushbutton Handbook Pub. EL-178. CUTLER-HAMMER, Inc., 1447 St. Paul Ave., Milwaukee 1, Wisconsin.

These pushbuttons may be flush type, extended type or with mushroom heads . . . in a wide range of colors for quick control identification. Standard, large, and jumbo size legend plates fit every type of operator and indicating light in the entire line.

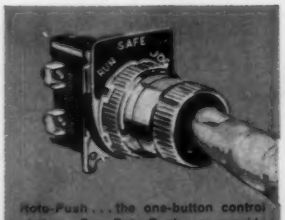
A maintained-contact pushbutton assembly that saves more than its entire cost by installation savings. New attachment with its pushbuttons mount in minutes; no fussy adjustments. Neither alignment nor spacing of units is critical. Pushbuttons will not bind or stick; always operate perfectly.

CUTLER-HAMMER
☆ ☆ ☆
MOTOR CONTROL
C-H

The C-H one-hole mounting oil-tight indicating lights with new wide-visibility lenses are the most visible from all angles by actual light meter tests. Available in either transformer or resistor types. Lenses offered in six different colors.

PresTest . . . the self-testing indicating light. Vital to safety and proper use of machines, particularly in automation. PresTest now permits instant proof light is NOT off because of burned-out bulb. Merely pressing on the light lens disconnects bulb from its normal circuit and checks it on a test power supply. Resistor and transformer types available.

The most complete line of oil-tight selector switches on the market. Key or knob operated; two or three position. Positions may maintain contact or have spring return. Three standard contact blocks provide a wide range of circuit combinations with the use of just a single block. Unlimited circuitry by adding blocks.



Roto-Push . . . the one-button control station. One Roto-Push can provide all the control functions for which two or three separate pushbuttons would be used normally. Available in a wide range of selector and button operators, Roto-Push simplifies panel design and saves installation time to cut costs. Improves machine-operator efficiency.

For more facts circle 714 on Reply Card

MAY, 1957

Plant Engineering

IN THIS ISSUE

They Raised the Roof—Result: Good Fireproofing 96
How Reliance Builds for Automation 98
To Move or Not To Move—
This Company Decided To "Stay Put" 103
Treated Cloth Is an Ekco Maintenance Treat 105
Hoerner Gets Designed-in Efficiency Two Ways 106
Helpful Ideas Improve Battery Servicing 109
Maintenance at Martin 110
Materials Pre-Tested on Special Board 114
Plastic Ductwork Confines Corrosive Acid Fumes 116
Pumps—and Why They Have Troubles 118
Fluid Power Maintenance
Part VIII. Pneumatic Cylinders, Controls, Piping 122
Fuses—What They Can Do for You 126
For Final Touch—Fans Are Balanced in Field 128
Chain Link Gadgetry 129
Making Test Fixtures?—How Pastushin Saves Money 131
What Makes the Flexible Plant? 134
Cathodic Protection Needed?
Test Conductors Connected to Piping Gave Answer ... 136
Corrosion—What You Can Do About It 139
Hydraulic Puller for Gear, Shaft, Bearing Repairs 141
Temporary Wall + Heat = Production 142
Activities of Plant Engineers' Societies 143
Penn-Ohio P. E. Society Organized 144
Program of Western Plant Maintenance Conference 146

REGULAR DEPARTMENTS

'Round About With the Editors 2
Bulletins and Catalogs 21
Backtalk and Forethoughts 28
Plant Engineers' Digest 38
Operation and Production 56
Court Decisions 83
What's Just Ahead in This Issue? 95
News from the Plants 150
New Plant Construction 160
New Products and Processes 186
Review of New Books 254
Data File of Commercial Literature 268
Advertisers' Index 294

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